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AN OUTLINE OF LOGIC

BY

BOYD HENRY BODE

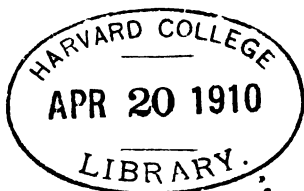
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**TO
MY MOTHER**

PREFACE

The aim of this volume is, among other things, to give a concrete discussion of ambiguity, to simplify the study of causal connections, and to treat with greater detail than is usually done the type of inference called circumstantial evidence, the nature of proof, and the postulates of reasoning. The place assigned to the syllogism is relatively small, the subject being presented with a minimum of detail. In the distribution of emphasis, the function of logic as a guide in reasoning has been constantly borne in mind. It is partly for this reason that the illustrations are, as a rule, taken from other sources than the physical sciences, because I incline to think that in the past these latter have been relied upon more than is desirable. Finally, I have added a chapter on sense-perception, in the hope that it will aid in making logic a propædæutic to philosophy.

A word or two of explanation may be in place regarding the discussion of causal connections. I have ventured to depart from the treatment made classic by J. S. Mill, because the treatment in question seems to me to be neither logically nor pedagogically justifiable. In the first place, we must distinguish between connections that are universal and connections that are causal, and also between the corresponding methods of proof. While a universal connection may be of a causal character, this is not necessarily the case. Moreover, the causes with which we habitually deal in science and in everyday life

are by no means universally followed by the effects with which they are properly correlated. The proof of causal connection as such is dependent, I think, upon the Method of Difference alone. It is not necessary to show in detail that Mill's other methods introduce no new principle. The Method of Concomitant Variations, for example, is merely the Method of Difference as applied when the point of difference shows quantitative variations. The Joint Method, which Mill himself calls the Indirect Method of Difference, is the Method of Difference as applied in comparisons between units which consist of groups instead of individual cases. The Method of Agreement can show, at most, a universal connection, without determining the character of the connection. Ordinarily the cases which are assigned to this method fall more properly under the 'Indirect Method of Difference,' as when we examine the connection between water supply and typhoid fever. And the Method of Residues, while informing us that the causes already known are not sufficient to account for the total effect, neither furnishes a clue to the remaining cause or causes, nor enables us to test their claim when they have been discovered.

The nature of my obligations to other writers, particularly to Professor James, will be easily discerned by the trained reader from the citations and references. I wish, further, to express my indebtedness to my former colleagues in the University of Wisconsin, Professors E. B. McGilvary and F. C. Sharp, who have read the book in manuscript and aided me with numerous valuable criticisms and suggestions.

B. H. B.

W.I.L.

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AN OUTLINE OF LOGIC

AN OUTLINE OF LOGIC

CHAPTER I

INTRODUCTORY

Reasoning or Inference.—The special subject-matter of logic is reasoning. What is meant by reasoning is shown most simply through contrast with what is not reasoning. Some facts may be known immediately or at first hand, while others are known through certain mental processes called reasoning or inference. The former kind of knowledge is independent of any experience other than the one of the present moment, while the latter is not. Thus we need no information outside the fact itself to inform us that the ache of a decaying tooth is disagreeable, or that the flame of a lighted candle is bright. These facts are known directly, with no help from other facts. They can be experienced by the child as well as by the adult. But if we say that the ache will stop when the tooth is pulled, or that the flame will burn the hand with which it comes in contact, the situation is different. In order to know this, we must have information based upon other experiences than the experience of the ache or the burn. The knowledge that the fire before us will burn is not immediate but mediate, i.e., it is acquired through our knowledge

of other facts. As a provisional statement, therefore, we may say that reasoning or inference occurs whenever we assert something to be true on the ground that something else is true. When the reasoning is intended to convince some one else of the truth of the assertion, it is usually called argument.

Good and Bad Reasoning.—We all know from experience that there is good reasoning and bad reasoning. If we say that B is true because A is true, A and B are supposed to be so related that the belief in A involves the belief in B. But we may be mistaken in this relation, in which case our conclusion that B is true does not ‘follow.’ According to some accounts, the wise men of Spain argued with Columbus that he could not reach India by sailing west, because if the earth were round, as he asserted, he would at some time reach a point where the ship would be going down hill and ultimately fall off, just as a miniature vessel would fall, if it should attempt to travel around an artificial globe. If A is true (earth round), B must be true (circumnavigation impossible). If there is a resemblance between earth and artificial globe in contour of surface, there must be a further resemblance, so it was held, in the relation of each to the objects upon its surface. In the same way we reason that because the fire which we see resembles other fires in its general appearance, it resembles these other fires also in burning the hand that comes too near. Both arguments are based upon resemblance, but the one is correct while the other is not. In making their comparison, the wise men overlooked an important point of difference, viz., that for an object on the artificial globe the point towards

which it gravitates is outside the globe, while for objects on the earth this point is within the earth itself.

A somewhat different form of bad reasoning is the inference that certain things, such as seeing the moon over the right shoulder, will bring good luck, or that certain 'charms' will ward off evil. Such beliefs are usually based on a coincidence that is interpreted to mean a causal relation. Here the inference is guided, not by resemblance, but by difference—by the difference in the state of affairs before and after the alleged cause made its appearance. The advertisements of patent medicines, with pictures to show the difference between before and after taking, furnish another illustration of the point. The belief in B—that the second event is the effect of the first—is based upon the belief in A—that the alleged cause was the only circumstance which was present to disturb the existing conditions.

It will appear more fully as we proceed, that all reasoning, both good and bad, goes back, in the end, to the awareness of resemblance or difference. As suggested by the illustrations just given, the correctness of reasoning depends upon the success with which the selection of resemblances or differences is made. The important question, therefore, is, How can we know when we have selected the points of resemblance or difference that are necessary to prove our point?

The Definition of Logic.—The reasoning by which a fact is supported, or upon which the assertion of a fact is based, is commonly called the evidence or proof for the fact. Unless otherwise specified, we shall use the words 'fact' and 'thing' in the

widest sense, as inclusive of anything positive or negative about which a statement can be made. When the reasoning seems to be trustworthy but is not so in reality, it is called a fallacy. The existence of fallacy makes it necessary to reflect upon reasoning, in order to determine how fallacies arise and wherein proof consists. Logic is sufficiently defined for our purposes if we say that it is the *science of proof or evidence*.*

If we are to learn the difference between good reasoning and bad reasoning, we must know something about reasoning in general. By ascertaining how reasoning proceeds, what methods it employs, and what assumptions it makes, we may discover what final test or standard it implies, and how fallacies occur. This final test will be stated when we have made a survey of the field. Our first concern will be to discuss actual reasoning in some of its phases, and the fallacies incident to reasoning.

The Awareness of Likeness and Difference.— The awareness of likeness and difference means that we put together things which in some respects are different from each other, and that we discriminate between things which in some respects are alike. It means, therefore, that to some extent we resolve things mentally into their elements, because we pick out their points of likeness and of difference and set them over against each other. In the act of noticing a resemblance we also take some account of the difference, for if we did not, we should not distinguish the two resembling things at all, and hence not be aware of any resemblance. All resemblance involves differ-

* Cf. J. S. Mill, *System of Logic*, Introduction.

ence, and all difference involves resemblance; but in reasoning it is sometimes the resemblance and sometimes the difference which is important and which becomes the object of our chief attention.

Concepts and Judgments.—We resolve things mentally into their elements by noticing their resemblances and differences when compared with other things. This process of dissection is a process that involves both analysis and abstraction. An object like a box, for example, we break up in thought into its various parts, and this phase of the process is called analysis. Then we retain one of these elements, say squareness, and discard the rest. This is called abstraction (Latin *ab*, and *trahere*, to draw away from), because the element has now been isolated from its setting. This quality we can thereafter recognize in the most diverse contexts, such as square buildings, square tables, and square areas of land; we know that whatever things resemble each other in being square, resemble each other also in the possession of the geometrical qualities that go with squareness. This attribute of squareness in its detached form is called a concept or idea. We can have ideas of attributes, such as ‘squareness,’ or of individual things, such as ‘this flash of lightning,’ or of ‘London,’ etc.; or of classes, such as ‘men,’ ‘fish,’ etc.; all of them being formed by the process of analysis and abstraction. Owing to this abstraction, ideas possess a fixity which is not found in sense-perception. Perceptions are changeable and transitory; whereas we can refer at different times to an idea as the same idea that we had before. “The function by which we mark off, discriminate, draw a line

round, and identify a numerically distinct subject of discourse is called *conception*,"* and the mental product of this act of conception is called a concept, idea, or meaning. A judgment on the other hand is sufficiently defined for the present if we say that it is the affirmation or denial of an idea, i.e., the assertion of something as true or false.

Concepts and Classes.—Leaving aside individual ideas for the present, we find that all ideas imply classification, for they are all ideas of something that can find embodiment in more than one instance. They are formed by the isolation of some attribute or set of attributes that are common to a number of different cases. It is true that we often do not think of the different instances in which the attribute in question is embodied. When we say, "Honesty is the best policy," or "Virtue is its own reward," we do not necessarily make any conscious reference to the different instances of honesty or virtue of which these sayings hold true. But unless the existence, in some sense or other, of these different instances is taken for granted, the assertions have no meaning. Words, therefore, which designate attributes may be taken as class names whenever it suits our purpose to do so. "By a class will here be meant any imagined group of individual cases, whether material things or immaterial, whether real or unreal,—a group in which every individual is supposed to resemble all the others in some respects, though differing in others. There are classes of actions and events just as of anything else; 'miracle' is a class name, for instance; or 'coronation,' 'battle,' 'eclipse'; in fact any name

* James, *Psychology* (Briefer Course), p. 239.

which is used so as to admit of a plural,—either simply, as ‘miracles,’ ‘negroes,’ ‘battles,’ or in the more circuitous form of ‘pieces of gold,’ ‘cases of deceit,’ and so on.’*

As this quotation indicates, a class name may consist of more than one word. Any word or group of words which serves to point out any imaginable subject of discourse is looked upon as a name or *term*. If the name is one that is applicable in the same sense to a number of different cases, the name may be regarded as a class name. Nor does it matter how temporary or artificial the group may be. “The men who at the risk of their lives entered the burning building in order to rescue the occupants” is as much a class name as ‘dog,’ or ‘tree,’ or ‘justice.’ Moreover, the existence of classes is implied in adjectives and verbs as well as in nouns. To say, for example, that appearances are deceptive, means that appearances belong to the class of things which are deceptive. And in ‘flowers grow’ the word ‘grow’ points to a class of objects which have the common characteristic of growth. Adjectives and verbs, therefore, are class names in so far as they are names which are not confined to a single thing but applicable in the same sense to a group of things.

The Extension and Intension of Terms.—It has been shown that class names have two aspects; they apply to a certain group of objects or ‘things,’ and they indicate certain attributes or characters. The size of the group to which the term applies determines the *extension* of the name, while the qualities for which it stands represent or determine the *inten-*

* Sidgwick, *The Use of Words in Reasoning*, p. 150.

sion of the name. Instead of extension and intension, the terms *denotation* and *connotation* are sometimes used. As one writer says, "The denotation of a name consists of the things *to which it applies*, the connotation consists of the properties which it *implies*." *

The Importance of Classification.—We have seen that classes are formed in every case on the basis of certain attributes or characters that are common to the class. As this world of ours is constituted, such an attribute or character may imply another, so that it serves as a sign of this other. If, therefore, we put into the same class the things that are alike in some particular quality, we may be enabled to know in advance what to expect from the entire class. To take a simple illustration, if we abstract the attribute 'fire' from one of its special forms, whether as a lighted candle, a burning match, or a bonfire, one unpleasant experience with fire will be sufficient to put us on our guard against all the rest. By such a process of abstraction and classification, the child learns that sugar is sweet; that water will quench the thirst; that crockery will break if dropped to the floor, while a rubber ball will not; that glass will cut the fingers, while sticks may be handled with safety; and so on throughout the whole round of its little existence. In adults we have, of course, the same sort of thing, only on a larger and more complex scale.

Classification is, in short, a device whereby we are enabled to simplify tremendously an environment which would otherwise be too complex for any finite intelligence. If we were obliged to become directly

* Bosanquet, *The Essentials of Logic*, p. 88.

acquainted with every object and every event, i.e., if things were entirely, and not merely partly, different from each other, adjustment would be impossible, since we should be unable to forecast the behavior of anything. We can anticipate the future and construe the past because certain things behave alike in certain respects. We can prove that certain things have happened in the past because we know what kind of causes are necessary to produce the given effects; we can foretell the future because we know what effects will be produced by the given causes; we are able to resort to *proof* because certain things can be depended upon to go together.

The Imperfection of Classification.—It has been stated that the awareness of likeness and difference leads to the formation of ideas and that this in turn involves classification. If the attribute in reference to which the classification was made is shown to be an invariable sign of some other attribute, we are in possession of knowledge that holds for the entire class. But in order to acquire such knowledge the classification must be made with sufficient care to bring out the point of resemblance that is common to the class. As a matter of fact, however, this resemblance is not always clearly discriminated. We may classify without knowing clearly wherein the different cases that are put into the same class resemble each other. Whenever this happens there is danger that we may take the wrong attribute as a sign of the second attribute. Such confusion is apparently at the basis of the assertion, “Nor are we much moved by the objection that it is wrong to enter the liquor trade, which appears to us just as legitimate as any

other.”* The line of reasoning by which the writer apparently reaches his conclusion is as follows: (1) Whatever is (morally) right is blameless. (2) A man has a good (legal) right to engage in the liquor business; and therefore (3) The liquor business is (morally) blameless. Persons who charge exorbitant rates of interest are apt to reason in a similar way. Moral right and legal right are classed together, and no distinction is made between the two. The fact that they are classed together indicates that they are alike in certain respects, viz., in the conformity to a standard. The standard differs, however, in the two cases. We cannot say that whatever is in conformity to a standard is blameless, but only what is in conformity with the moral standard. This distinction is not made, because in classing moral right and legal right together we do indeed recognize a resemblance, but we do not take the pains to discover wherein they are alike and wherein they are different, with the result that the undefined resemblance is taken as a reliable sign of the second attribute, ‘blameless.’ If our ideas always involved sufficient analysis, such errors would not occur. But if these fallacies are to be properly appreciated we must know how classifications are actually made and how the shortcomings of our classifications are intensified by the names that are applied to them. The consideration of these topics, therefore, will be our next undertaking.

* *Fortnightly Review*, Vol. 27, p. 2.

CHAPTER II

CLASSIFICATION AND CLASS NAMES

It has been pointed out that by means of classification we are enabled to simplify an environment which would otherwise be much too complex for rational conduct. Things that are found to be alike are called by the same name, and we ordinarily proceed on the assumption that the point of resemblance which we have discovered and on the strength of which the name has been applied, is invariably related to some other quality, so that we know beforehand the nature of the entire class. Since classification is so important, it is not a matter of accident that we apply the same name to things which resemble each other in certain respects. Now if names were perfect instruments, they would indicate wherein the different things are alike. They would be names for the common points of resemblance and nothing more. The point of resemblance being known, we could ascertain what quality or attribute goes with it, if any. But this ideal is not often realized. In the case of simple attributes such as squareness, straightness, duration, etc., the point of resemblance is sufficiently well understood for most purposes. Then there are certain 'natural' groups, which for all ordinary purposes can be indicated by a class name with little danger of error, even though we do not know very precisely what the

nature of the resemblance may be. It is usually safe to speak of 'men,' 'horses,' 'trees,' and similar objects and to draw certain inferences concerning them, in spite of the fact that we are unable to define these terms. But even if we grant that terms like the above are not likely to cause trouble, there is still a large group of terms such as 'capital,' 'labor,' 'religion,' 'education,' 'government,' etc., which, owing to their vagueness, are the source of endless confusion. When the nature of the resembling qualities is not known, the terms are almost sure to mean different things on different occasions, with the result that what is true of some members of the class only, is taken to be true of all.

Undefined Similarity and Metaphor.—A study of language soon reveals the fact that clearly defined ideas and correspondingly definite class names are not to be found in the early stages of thought and language, but presuppose development and effort. In order to understand the development of ideas and language, it is necessary to realize that a resemblance may be 'felt' before we know wherein it consists. The fact that the nature of the resemblance which underlies the extension of a name need not at the outset be clearly apprehended, is both curious and significant. It is possible to see a resemblance among different things, and yet be utterly at a loss to know just wherein the resemblance consists. Thus a person may be a good judge of faces and be able to classify them with considerable skill as good or bad, but his ability to give reasons for his opinions may lag woefully behind. He does not know just why he judges as he does. There is something in the criminal

type of face, for example, which he somehow detects at once and which fills him with aversion, and yet he is unable to point out what it is. The common attribute or point of resemblance is 'felt' rather than distinctly conceived. Physiognomy is a study that attempts to analyze out those common characteristics which enable us to classify faces as we do. We classify them, not through blind instinct, but on the basis of an unanalyzed resemblance.

Whenever the similarity is so intangible that we are unable to specify the point of resemblance, we can only indicate the resemblance by describing one thing in terms of another, i.e., by means of a metaphor. The use of a metaphor, so far as we are at present concerned, means the application of a name that stands for a complex of attributes to some object or thing which possesses only a portion of these attributes, without specifying which of the attributes are possessed by the object or thing in question. To take a familiar illustration, the statement that the camel is the ship of the desert is metaphorical, for while the camel is a ship in some respects, it is not a ship in every respect. The word 'ship' includes a complex of attributes, and the statement does not make clear which of these attributes it means to ascribe to the camel. In a similar way, we speak of a person as being 'metallic'; or, to borrow an illustration from Professor James, we may describe a family as having 'blotting-paper' voices. Such terms are universally recognized as metaphors.

"The mode in which words are learnt and extended may be studied most simply in the nursery. A child, say, has learnt to say *mambro* when it sees its nurse.

The nurse works a hand-turned sewing machine, and sings to it as she works. In the street the child sees an organ-grinder singing: it calls *mambro*: the nurse catches the meaning and the child is overjoyed. The organ-grinder has a monkey: the child has an india-rubber toy; it calls this also *mambro*. The name is extended to a monkey in a picture-book. It has a toy musical box with a handle; this also becomes *mambro*, the word being extended along another line of resemblance. A stroller with a French fiddle comes within the denotation of the word: a towel-rail is also called *mambro* from some fancied resemblance to the fiddle. A very swarthy hunchback *mambro* frightens the child: this leads to the transference of the word to a terrific coalman with a bag of coals on his back. In a short time the word has become a name for a great variety of objects that have nothing whatever in common to all of them, though each is strikingly like in some point to a predecessor in the series. When the application becomes too heterogeneous, the word ceases to be of use and is gradually abandoned, the most impressive being the last to go. In a child's vocabulary where the word *mambro* had a run of nearly two years, its last use was an adjective signifying ugly or horrible." *

The history of the child, as just exemplified, merely epitomizes the history of the race. "The first words are probably names of entire things and entire actions, of extensive coherent groups. A new experience in the primitive man can only be talked about by him in terms of the old experiences which have received names. It reminds him of certain ones from among them, but

* Minto, *Logic*, p. 83.

the *points* in which it agrees with them are neither named nor dissociated. Pure similarity must work before the abstraction can work which is based upon it. The first adjectives will therefore probably be total nouns embodying the striking character. The primeval man will say, not 'the bread is hard,' but, 'the bread is stone'; not 'the face is round,' but, 'the face is moon'; not 'the fruit is sweet,' but, 'the fruit is sugar-cane.' The first words are thus neither particular nor general, but vaguely concrete; just as we speak of an 'oval' face, a 'velvet' skin, or an 'iron' will, without meaning to connote any other attributes of the adjective-noun than those in which it *does* resemble the noun it is used to qualify."*

The inevitable tendency of the process just described is to make the point of resemblance stand out prominently amid the different settings. As the number and variety of instances increase, we not only learn to recognize the resembling quality readily, but we also succeed in distinguishing it from its different contexts. The resemblance is no longer merely felt, but is clearly conceived, i.e., a concept is formed.

How Words Change in Meaning.—It has been indicated how the use of names involves a process of differentiation. By grouping different things together, both the resemblances and the differences tend to become prominent. As this differentiation goes on, the function of the names employed is bound to undergo a change. The change may occur in a variety of different ways. In the first place, the name may come to be limited to the attribute which is found to be common to the whole class. Thus the word

* James, *Psychology*, Vol. II., p. 365.

'oval,' in the quotation just cited, no longer connotes 'egg,' but points out one specific quality, viz., a certain shape. In a similar way the word 'fluid,' which to the minds of many persons suggests indefinitely nearly all the qualities of water, is narrowed down to a single quality, when a comparison between water and gases teaches us to distinguish between moisture and mobility of parts.

Secondly, the word in question may be confined to one of the special meanings that have been made explicit by the differentiation. Thus 'attention' meant originally a 'stretching-to,' and its application to a mental attitude rests upon the resemblance between this attitude and the physical fact. At present, however, the word is restricted to the mental attitude. Similarly the word 'prevent' meant originally a 'coming-before'; a meaning which survives in the Scriptural passage, "I prevented the dawning of the morning" (Ps. 119:147). From this meaning it is but a step to the coming-before which signifies hindering or thwarting, and this meaning has finally monopolized the term. We find this kind of change, again, in the word 'prove' (Lat. *probare*), which originally meant 'to test,' a meaning which has been preserved in the saying, "The exception proves the rule." The specific meaning that it possesses at present is 'tested successfully,' or 'tested and found reliable'; and it is in this sense that an assertion or mathematical theorem is said to be proved. With this meaning of the word, however, the saying that the exception proves the rule is, of course, pure nonsense.

Thirdly, as the process of differentiation goes on,

the name may be retained by each of several connotations, which, after the differentiation has been completed, have little to do with each other. Thus it happens that we speak of the house across the street, and the house of Hohenzollern; the Secretary of State, and the President's secretary; his father's counsel, and the counsel for the railway; the church on the corner, and the Church of Rome, etc. Originally these names doubtless betokened some unanalyzed or imperfectly analyzed resemblance. That the words of this class are very numerous can easily be ascertained by glancing over a few pages of any standard dictionary. The word 'clerk,' for example, means "Clerk in holy orders, church clerk, town clerk, clerk of assize, grocer's clerk. In early English, the word meant 'man in a religious order, cleric, clergyman'; ability to read, write, and keep accounts being a prominent attribute of the class, the word was extended on this simple ground till it has ceased altogether to cover its original field except as a formal designation."* The sharp discriminations of meaning found in the dictionary and in common usage point to an antecedent period in which the meanings were less clearly differentiated. By some minds these distinctions are perhaps not reached at all. It is not uncommon, for example, to find that some people attribute to the church as a building a measure of the sanctity and divinity which they ascribe to the church as an institution.†

Vagueness.—We have seen that the use of metaphor is the first step in a process of differentiation

* Minto, *Logic*, p. 85.

† Cf. Jevons, *Lessons in Logic*, Lesson VI.

which has as its goal a class name that serves, on the side of denotation, to point out a group of things definitely marked off from other things, and, on the side of connotation, a group of attributes that can be definitely specified and enumerated. A word ceases to be a metaphor and becomes a class name when it connotes those attributes which are common to the different members of the class, to the exclusion of the attributes which are peculiar to individuals. Thus the word 'ship' in the saying, "The camel is the ship of the desert," is a metaphor and not a class name, because the meaning of the term is not confined to the attributes common to both vessels and camels. On the other hand, a word like 'man' is a class name, because it stands for certain generic attributes, apart from the peculiarities of race, nationality, custom, or occupation. These common qualities, however, may be 'felt' rather than distinctly conceived; and when this is the case, when we are able to go but a short way in the enumeration of the attributes connoted by a term, it is said to be vague. Examples are found in terms like 'society,' 'gentleman,' 'wealth,' 'spirit,' and 'culture.'

A term, therefore, is vague in so far as we are unable to state its connotation. So long as the term serves the purpose for which it is intended, the vagueness may not matter a great deal. We constantly employ terms which we are unable to define, without suffering any particular inconvenience from the fact. But this is not always the case. It has just been shown that, as experience grows, words change their meaning, or—what is the same thing—we change our classifications. Things which at first are classified

together rather promiscuously on the basis of an un-analyzed resemblance, tend to fall into sub-classes, as was illustrated in connection with the terms 'house,' 'secretary,' 'counsel,' and 'church.' Each of these sub-classes involves its own distinctive principle of grouping or point of resemblance, but until the various meanings have been differentiated from each other, these resemblances are merely 'felt.' The result of it all is that the term which covers all these sub-classes may mean different things in different contexts, without our being aware of the fact. When this occurs, confusion and fallacy become inevitable.

As an illustration of the matter under discussion we may take the following passage: "The words 'nature' and 'natural' are constantly bandied about in controversy as if they settled quarrels, whereas they only provoke them by their ambiguity. Slavery has been condemned as an 'unnatural' institution, and has been defended on the ground of the 'natural' inferiority of some races to others. The equality of the sexes is asserted and denied on the ground of 'nature.' The 'natural' goodness and the 'natural' badness of mankind have been maintained with like earnestness and sincerity. 'To live according to Nature' was the Stoic formula for the good life; those Christian theologians, who have in some ways most intellectual and moral affinity with the Stoics, have been those who have spoken most strongly about the corruption of 'the natural man.' 'Natural religion' means something very different from 'Nature worship.' 'A natural child' means a child born out of wedlock; but 'an unnatural child' is not necessarily

legitimate. 'A state of nature' may mean the absence of clothing; but such absence is not considered essential to the possession of 'a natural manner' in society. To the sentiment that 'Nature is a holy thing' may always be opposed the proposition that 'Nature is a rum 'un,' and, in view of the ambiguity of the term, the theory of Mr. Squeers is perhaps the more easily defensible of the two."*

A further illustration of the same fact may be drawn from the debates between the defenders of 'State Rights' and the 'advocates of the national theory of government,' concerning the proper interpretation of the Constitution. The opening words of the preamble, "We, the people of the United States, in order to form a more perfect union," serve to show how vagueness may be concealed beneath an appearance of innocence and simplicity. With regard to this phrase, J. C. Calhoun, the famous exponent of state rights, says, "The advocates of the national theory of government, assuming that, '*we, the people,*' meant individuals generally, and not people as forming states; and that '*United States*' was used in a geographical and not a political sense, made out an argument of some plausibility, in favor of the conclusion that '*we, the people of the United States of America,*' meant the aggregate population of the States regarded *en masse*, and not in their distinctive character as forming separate political communities." This interpretation, according to Calhoun, is fallacious. Moreover, "It could not have been intended, by the expression in the preamble,—'to form a more perfect union'—to declare, that the old was abolished,

* Ritchie, *Natural Rights*, p. 20.

and a new and more perfect union established in its place; for we have the authority of the convention which formed the constitution, to prove that their object was to continue the then existing union."*

A word may be vague for either of two reasons:

(a) We may never have tried, or succeeded, in differentiating the various meanings which it has already acquired (as in the case of a word like 'nature'); or, (b) A new situation may arise to which the former meanings of the term are inadequate. A concrete instance of such a situation is furnished in some incidents which occurred in connection with a recent election for United States senator. The national law provides that each house of the legislature shall vote separately, and that "the person so voted for who receives a majority of the whole number of votes cast in each house" shall be considered elected. In this particular instance one of the candidates received a majority of the votes in the lower house of the legislature. In the upper house, or senate, he polled a vote of twelve, out of a total of thirty-three. Of these thirty-three, however, there were sixteen who voted for none of the candidates, but who merely voted 'present.' This procedure raised a difficulty, which is stated in a newspaper report as follows:

"Are the sixteen senators who voted 'present' to be counted as 'voting' at all? If they are, then Blank's twelve do not constitute a majority of the thirty-three senators, but if they are regarded as merely 'present,' then of the remaining seventeen Blank's twelve are a majority. Those who voted

* Calhoun, *On the Constitution and Government of the United States*.

'present' claim they actually 'voted,' and that they are entitled to be counted as actually voting; therefore, that Blank failed to obtain a majority of the 'whole number of votes cast.' Just there is the crux of the situation. If these sixteen are treated as merely present, but not figuring in the 'whole number of votes cast,' Blank is already elected."

The question thus presented was not settled at the time; and a few days later, when the legislature met in joint session, as required by law, a similar question arose. There were 124 votes cast, of which Blank got 62, just one short of a majority. One vote, however, for Blank had not been counted, for the member who cast the vote had requested leave to withdraw it, on the ground that he was 'paired' with another member. When he voted he thought that this other member was present and that he was therefore released from his agreement; "but finding to the contrary before the clerk had announced the result, he asked to withdraw his vote. The clerk naturally heeded his wish. But some of Blank's supporters assert that he was present, that he actually voted, and that the rules governing the legislature, or the federal law governing senatorial elections give no recognition to 'pairs'; therefore that the clerk could not cancel the vote nor could it be withdrawn—that, in fact, it stands, thus giving Blank 63 out of 125 votes cast, a majority of one."

The occurrences just described tend to show that an element of vagueness inheres in all language. Not only are we unable to give a respectable definition of many everyday terms, but, as we have just seen, situations may arise in which our previous meanings are

inadequate. Thus in order to determine whether the legislators 'voted' or not, we are obliged to define, more closely than we have done before, what is meant by 'voting.' Since we do not know everything about anything, our thinking is necessarily vague in some degree, and as a consequence our language is vague. The danger of fallacy that lurks in vague thinking is much increased by the use of words. Indispensable as language is for the development of thinking, since it furnishes us with convenient labels or symbols wherewith to recall concepts previously formed, it must be recognized at the same time that names may have the effect of drawing our attention away from the differences among things. It has been shown that we have a tendency to recognize resemblances, without attempting to analyze them. If it happens that different things have the same name, the name serves to call our attention specifically to the resemblance, and in this way it decreases the chance that the differences will be noticed. We find the classification an accomplished fact, and we incline to accept it at its face value. Eternal vigilance, therefore, is the price of safety in the use of words. To understand the deceptive character of words, however, is in itself a protection, since to be forewarned is to be forearmed. The fallacies that arise from vague class names are known as ambiguities, which will be taken up more in detail in the next chapter.

CHAPTER III

AMBIGUITY AND DEFINITION

Illustrations of Ambiguity.—Our study of class names has shown that vagueness is their normal state rather than the exception. To render their meaning precise usually requires considerable effort, and even then we do not always succeed. Our present task is to trace in detail the way in which this vagueness becomes the source of ambiguity. The following argument is a case in point:

“The better the law in any state of society the more good will be obtained from it, and from a prohibitory law half enforced more than from the most stringent license law enforced to perfection. Besides, Prohibition always holds up before the public mind the loftiest ideal of absolute right in the law. Thus the statute book, like the Bible, becomes an educator, although it may be violated. I am no believer in low, bad laws because there is vice and degradation among men. Lift up the ideals. It is injurious to society to ignore and violate the laws of Nature and of God. The golden rule is none too good law for the savage. God’s own laws being perfect are most violated, yet none of them have been repealed on that account. They are not enforced as well as the Maine liquor law, but the Ten Commandments are as inflexible as the stone text of the original, and their author issues

no license even to those who pay fees into the Treasury of the Temple itself. It will only confirm existing drunken habits and enable the devil to retain his own, for us to adopt his legislation because we are not able fully to enforce any other." *

As to the merits of the question at issue we need not stop to inquire. So far as we are concerned, prohibition may be wise or unwise; our present business is solely with the reasoning by which the position adopted in the preceding quotation is defended. According to this reasoning, the objection to prohibition that it cannot be enforced may be set aside on the ground that the value of a law is determined essentially by the nature of the ideal which it bodies forth. It is held that the value of a prohibitory law is no more dependent upon the question of enforcement than is the Golden Rule or the Decalogue. A little reflection, however, reveals an important difference, viz., the difference between a moral law and a statutory law. Since these laws resemble each other in that both are rules of conduct, we call them by the same name; but the moral law includes certain demands, such as industrious habits and the avoidance of evil thoughts, which do not properly fall within the scope of statutory law. We have, therefore, ground for the suspicion that the value of a statutory law is determined by other considerations besides its conformity to the moral ideal. The result of this failure to recognize any important difference between the two kinds of law is the assertion that what is true of some laws (viz., moral laws) is necessarily true of all.

How readily a vague term like 'law' lends itself

* *North American Review*, Vol. 147, p. 131.

to ambiguity may be further exemplified by the following argument:

“ The existence of a power [above nature] is even implied in the phrase ‘ laws of nature,’ constantly used by science; for wherever there is a law there must be a lawgiver, and the lawgiver must be presumed capable of suspending the operation of law.” *

Here we have in a single sentence an argument for the existence of God and for the possibility of miracles. Since law implies a lawgiver, and nature has laws, nature must have a lawgiver, and the lawgiver must be able to suspend the law on occasion. It seems rather improbable that a question which has caused so much debate should admit of a decision in such short order, and we have reason to suspect that language is playing us a trick. The laws of nature and the laws promulgated by an authority undoubtedly have a certain resemblance. What the nature of the resemblance is we are fortunately not obliged to decide. The argument, however, asserts that the resemblance, whatever it may be, includes the presupposition of an authority. Is this the case? It would rather seem that at just this point an important difference exists, a difference which some one has expressed by saying that law in the legislative sense is a *prescription*, whereas natural law is a *description*. Here the difference is not between moral law and statutory law, but between statutory law and uniform sequence. Owing to this difference, we are not entitled to infer that what is true of some, with regard to origin, is necessarily true of all. Whether a different line of reasoning might not prove that natural

* Goldwin Smith, *Guesses at the Riddle of Existence*, p. 143.

law originates in God is, of course, an entirely different matter; our concern at this moment is to show that the argument under consideration turns on an ambiguity.

An ambiguous argument correctly assumes some resemblance among the members of the class, but it mistakes the nature of the resemblance, and this is the reason why a statement which is supposed to be true of all is true only of some. This is equivalent to saying that the class name has a special connotation in this connection. It implies not merely the attribute which is common to the whole class, but also the peculiarities which distinguish a certain part of the class from the rest. Thus when it is said that law presupposes a lawgiver, the word law connotes not only the attribute of a certain fixed order, which is peculiar to all forms of law, but law in the special sense of a certain rule of conduct. Unless we take it in this sense, the statement does not hold. We cannot say that the kind of fixed order possessed by all forms of law necessarily implies a lawgiver. In other connections, however, the class name is used in a sense which holds for other members of the class, as when we speak of the laws of nature. Ambiguous terms, therefore, have more than one meaning, and in order to expose the fallacy these different meanings must be brought to light. A rule that should always be observed in practice is to substitute other terms for those to which a suspicion of ambiguity attaches itself. The terms so substituted should aim to express the special connotation in each case. When this is done the plausibility of the argument vanishes at once. Thus, if we should say that law *as a rule of conduct*

implies a lawgiver, and that nature has regular sequences, it would not occur to any one to draw an inference from these two statements.

How readily the appearance of cogency may be dispelled by substituting for the ambiguous terms may be seen in connection with the following argument:

“ My grandmother would say, for example: ‘ Whatever sin is committed against an infinite being is an infinite evil. Every infinite evil deserves infinite punishment; therefore, every sin of man deserves an infinite punishment.’ My uncle Bill, on the other side, would say: ‘ No act of a finite being can be infinite. Man is a finite being; therefore, no sin of man can be infinite.’ No finite evil deserves infinite punishment. Man’s sins are finite evils; therefore man’s sins do not deserve infinite punishment.’ When the combatants had got thus far, they generally looked at each other in silence.” *

In this case opposite conclusions are reached and the honors of war are apparently about even. It is evident that everything depends on the terms ‘ infinite ’ and ‘ finite ’ which are used so freely, but with no attempt at analysis; it being assumed that their meaning is sufficiently clear. But if we substitute for the doubtful terms, we get something like this for the first argument: “ Whatever sin is committed against a being who is perfect in power and knowledge and moral attributes, is an evil immeasurably great. Every thoroughly malicious evil deserves endless punishment; therefore every sin of man deserves

* H. B. Stowe, *Old Town Folks*, quoted by Lafleur, *Illustrations of Logic*, No. 107.

endless punishment." It may be, of course, that these substitutions are not quite fair to the spirit of the argument. But it may be asserted that no meaning which may be assigned to the term infinite will serve the purpose which the argument has in view. The same treatment should be applied to the second argument, which will be found equally inconclusive.

The Definition of Ambiguity.—It has been shown how the same name may apply to a number of things which in some respects are widely different from each other. Some of these differences may be important in a given situation, while others are not. If it is claimed that law presupposes a lawgiver, the distinction between 'laws of the country' and 'laws of nature' is important, while the distinction between statutory law and common law is not. On the other hand, if it should be asserted that law is the product of formal legislative enactment, this latter distinction becomes important, since the assertion would hold only for statutory law, common law being unwritten and the product of custom and precedent.

Ambiguity has to do with those distinctions which are important for the time being. Ambiguous terms are always vague, but vague terms are not necessarily ambiguous. Vagueness is, therefore, not the same as ambiguity, because the vagueness may be unimportant. 'He goes to church every Sunday,' 'All good citizens respect the law,' and 'Many old soldiers are pensioned by the government,' are statements which employ vague terms like 'church,' 'law,' and 'government,' but they are not on that account ambiguous. It may be that the person who uses these terms is unable to define them, but

this is a matter of no concern, provided that his meaning is conveyed with sufficient definiteness for the purpose in hand. The illustrations just given would not ordinarily be considered ambiguous, because in each case a clue to the special meaning is furnished by the context, which shows what kind of church, law, and government respectively is intended. Nor, again, are single words ever ambiguous, even though they have a number of different meanings. They are not ambiguous, for the reason that there can be no question which meaning is the important one, since each term stands for all its meanings impartially. Terms are ambiguous only as parts of a statement. Ambiguity may therefore be defined as *the neglect of distinctions in the meaning of terms, when these distinctions are important for the given occasion.*

The Nature and Purpose of Definition.—The remedy for ambiguity lies in definition. To define is to point out the meaning that is required for the given occasion. According to an old rule which has come down through many centuries of logical tradition, definitions are to be framed in terms of *genus* and *differentia*. The genus is the class of which the thing to be defined is a member; the differentia is the character or group of characters which distinguish it from other members of the class. Thus the genus of 'horse' would be the wider class 'animal' or 'vertebrate'; the differentia would be those peculiarities which differentiate the horse from other animals. In a similar way law might be defined as a rule of behavior (genus), laid down by a certain authority (differentia).

While this rule is true enough in the abstract,

it evidently fails to give us any indication which definition is the one that is required at the given moment. The same genus and differentia will not serve to bring out the different meanings of a given term. "As a matter of fact there are several purposes of definition, several different reasons why we may want a word's meaning stated; and among these a broad division into two main kinds should always be kept in view. Sometimes, in asking for a definition we want to know in general what is the meaning of a word, how it is used, or how it ought to be used in most of its possible contexts—for instance, what is the most widely accepted meaning, or the most convenient meaning for general purposes, or the meaning accepted by the best authorities, or the meaning most historically accurate, most prominent at the time when the word was first invented or adopted. Sometimes, on the other hand, none of these questions are asked, but the questioner's whole desire is to discover how the word is used in some assertion where he finds it ambiguous, and so to get the ambiguity removed. Both these processes are commonly called definition, and the information we get in answer to either kind of question has a certain value. But there is a real difficulty in remembering—what is evident enough when we think about it—that an answer which is valuable for the former purpose may have (on a particular occasion) not the smallest value for the latter. The 'general' definition may give you no hint as to the way in which a particular assertion is meant to be interpreted. You may know the general meaning of a word and still find it ambiguous in a particular context, and then, of course,

the best possible definition of the former kind may only give you stale information and do nothing towards removing your difficulty." *

The value of this distinction may perhaps be best shown by example. Suppose it should be argued that the evils of life merit no consideration, for the reason that transitory things are unimportant, and human life as a whole is transitory. We may suspect that the word 'transitory' is ambiguous and turn to the dictionary for a definition. There we find a general definition of this sort: 'existing for a short time only; quickly passing; shortlived; transient' (Standard Dictionary). But this leaves us just where we were, for the ambiguity reappears in 'short time,' 'quickly passing,' 'shortlived,' 'transient.' The distinction that we need here is the distinction between what is transitory as compared with the length of human life and what is transitory in terms of some larger standard like historical or geological epochs. In other cases the standard may be still different, as when we say that the speaker's hesitation or embarrassment was but transitory. All are 'quickly passing' indeed; yet these different instances have little in common except the name. The rule for framing definitions gives no clue as to the selection of the genus and differentia. The speaker's hesitation must be differentiated from events that endure more than a few moments; the transitory things of our experience must be marked off from those which last months or years; and life as a whole must be contrasted with things that endure for centuries. But this requirement can be discovered only from the circumstances

* Sidgwick, *The Use of Words in Reasoning*, p. 42.

surrounding the case, i.e., from the purpose which the definition is to subserve.

Definition and Synonym.—The difference between a definition and a synonym is that the synonym merely substitutes another term which in this particular situation is just as ambiguous as the one that it supplants. ‘Shortlived’ and ‘quickly passing,’ for example, are not definitions of ‘transitory,’ as this word was used a short time ago, but merely synonyms or synonymous expressions. In a similar way we sometimes speak of a definition as ‘merely verbal.’ It tells us the general meaning of a term, when what we wish to know is the meaning that it has in some specific connection. To quote from a dictionary when our task is to discover, not a general but a specific meaning, is to offer a ‘verbal’ instead of a real definition. “In the topic, ‘Should the United States have exclusive jurisdiction over the Bering Sea?’ if you look up ‘exclusive jurisdiction’ in a dictionary and find ‘entire, supreme control,’ as its equivalent, how much have you gained in clearness? What are the limits of ‘entire control’; by what law, common or international, are they applied? Just how much, too, is meant, geographically, by ‘Bering Sea’? Does the term in this case cover the straits leading into the waters marked on the maps by this name? Here are many questions not to be answered offhand, but only after careful examination of the material on the question.” *

Application to Law.—In the preceding chapter it appeared that old and familiar terms may fail us when new situations arise. If the situation is of

* Baker, *The Principles of Argumentation*, p. 44.

such a kind as to require a new distinction, the term becomes ambiguous. This kind of situation is of constant recurrence in legal practice. The following passage from the circular of a teachers' agency shows how the issue in a case may turn upon the new interpretation that is given to a term; and incidentally also how an innocent-looking contract may be a snare for the unwary. "We do not say that the commission is due us when a position is 'secured' through the agency. The commission is not due us until you 'accept' a position secured through the agency. Positions are not infrequently secured for teachers on the strength of information furnished by agencies to the employer, and sometimes they are not so situated that they can accept them, and probably they do not want them. In cases of this kind you would not be held for the commission by us." The proper meaning of a word like 'secure' may on occasion become a matter of serious doubt, and the outcome of a case in law may, at best, be a matter of conjecture.

How new situations may require new interpretations is suggested rather startlingly by the following extracts from a discussion entitled, *Trespass on a Landowner's Air*:

"This question, which until recently has been purely academic, is now arising in connection with the probable increased use of appliances for aerial navigation. Does a balloon trespass on a man's property simply by passing over it? What is alleged to be the first case in which an aeronaut was held liable for trespass was decided in a London court on June 8. While the defendant was passing over Priory-lane, Roehampton, his balloon descended and the grappling-

iron broke several telephone wires. The Postmaster-General, who sued for the cost of repairing the wires, was held entitled to judgment for 16s.—the amount of the damage. Commenting on this, a writer . . . says:

“ ‘ So long as the balloon passes over land at a great height the rights of property-owners are not likely to be seriously considered. But the mere fact that rights have never been enforced does not prove that they do not exist. Is the passage of a balloon or an aeroplane over a piece of land a trespass in the eye of the law? According to Blackstone: “ Land hath also, in its legal signification, an indefinite extent, upward as well as downward ” . . . Applying this definition of land, it is easy to see that the balloon or aeroplane may pass through the property of many owners during a single flight. It may be that the flight does no actual damage; but that is immaterial. A man may walk across the property of another and do no damage, yet he is a trespasser, against whom a remedy may be pursued in the courts. Again it is a trespass to suspend anything over a man’s land, even if its presence does him an infinitesimal amount of harm.’ ”

“ Numerous decisions in regard to shooting over a man’s land, without touching any part of it, apply here. Injunctions have been granted to prevent such shooting.”

It is evident that the connotation of the word ‘ trespass ’ must be made more explicit to meet the emergency. Moreover, this is merely one among other possible ambiguities. As the article concludes: “ Considerations of the probable rights of a landowner

against the aviator naturally direct attention to the rights of one aviator against another. Who shall define what is negligence in the management of an aeroplane? What is the rule of the road when there is no road? Must a machine going north pass over or under a machine going south? Must a horn be carried of sufficient power to fill the airy deep for miles around? All these questions occur to the mind: to none of them can any lawyer give a satisfactory reply."*

One more illustration may be added to show that the scope or meaning of legal terms cannot be fully determined in advance of experience. The Constitution gives to Congress the right to regulate interstate commerce. On the basis of this provision Congress passed, in 1906, what was known as the Employers' Liability Act, which provided that common carriers should be subject to certain liabilities to their employees, in case the latter were injured in the performance of their duties. Can such a law be said to 'regulate' commerce? In a certain sense it doubtless can, for anything that affects the railroad companies must have some indirect influence upon interstate commerce. But is the influence sufficiently direct to bring this law within the spirit of the Constitutional provision? On this point opinions were bound to differ, and the only possibility of settling the matter lay in an appeal to the courts. All that any legislative authority or written constitution can do is to lay down more or less general rules for procedure. The import of the general rules becomes gradually clearer, i.e., becomes defined, as the decisions of doubt-

* *The Literary Digest*, July 3, 1909, p. 14.

ful cases increase in number, and so it is easy to see why precedent should count for so much in law.

Ambiguities of the sort just noticed abound in everyday life, as might be expected. No matter how extensive our knowledge, there is always a ' twilight zone ' where it is difficult to decide whether or not a promise was really fulfilled, whether a certain decision was wise, whether a certain course of conduct was dignified and just. In this region agreement can never be expected, because the peculiarities of temperament and training are in the last resort the dominating factors.

CHAPTER IV

SOME SPECIAL FORMS OF AMBIGUITY

Why Ambiguities are Classified.—All ambiguities resemble each other in that they slur over some distinction which sound reasoning requires to be made explicit. This slurring over, however, may occur in a variety of ways; and for this reason many attempts have been made to classify the different forms of ambiguity. This is, of course, a perfectly legitimate undertaking, but it should not be overlooked that such classification has value only up to a certain point. Any one who attempts this classification soon finds that he is engaged in an endless task, since the only limit to the classification is his ingenuity in discovering distinctions. A classification that is too elaborate to be easily remembered and applied, serves no useful purpose. To avoid such a result we shall be content to consider a few of the more common types of ambiguity, so as to recognize them more readily when they come our way.

The Fallacy of Accident.—This fallacy has to do with the interpretation of statements made by some one else. It is a fallacy that is committed, not by the person who makes the statement, but by the one who construes it. The source of the fallacy lies in the distinction between what is meant and what is said; or, in the language of logic, in the difference between the judgment and the proposition. A judg-

ment is an assertion, i.e., an affirmation or denial of an idea; while a proposition is a judgment expressed in words. It frequently happens that judgment and proposition do not quite coincide. The proposition may be either too wide or too metaphorical to be taken literally; or it may permit of various interpretations, if taken in isolation. What is really intended can often be determined by other statements of the same speaker or by the use of a little common sense. The fallacy of accident consists in the neglect of some qualification or limitation which is left unexpressed, but which, in fairness, should be taken for granted. As the name implies, this fallacy confuses the essential with the accidental, the spirit with the letter.)

It has already been said that the failure to point out an important distinction is not an ambiguity, if there is good reason to suppose that the distinction is recognized. Distinctions may be so obvious that they are taken for granted. 'A person should not live beyond his income,' does not necessarily mean that he must never incur obligations which he is unable to meet on the spot. The statement holds only for a limited number of cases, a qualification such as 'other things equal,' or 'under ordinary conditions,' or 'as a rule,' being implied. Or if we should say that a certain individual will succeed in some undertaking, because 'where there's a will there's a way,' it is likely that the reason which is assigned requires closer specification, since there are instances in plenty where the most determined will fails to find a way. What is meant, perhaps, is that this person with his peculiar talents and under these particular conditions, may be expected to succeed. It is frequently nec-

essary to assume that the speaker recognizes qualifications of this kind, at least in the sense that if he were questioned regarding the matter, he would limit the statement.

That sweeping statements must not be taken too seriously, is a fact which has long been recognized, after a fashion, by common sense. Popular maxims, for example, into which practical experience frequently condenses itself, are not, as a rule, meant to be taken without qualification: We are told that haste makes waste; that honesty is the best policy; that larger ships may venture more, but smaller barks should stay near the shore; that early to bed and early to rise, makes a man healthy and wealthy and wise. As they stand, these bits of wisdom suggest no limitation to their scope. The qualifications are not appended to the maxims in the form of provisos, but are expressed in other maxims which claim equal authority with the first. Haste may be injudicious, yet it is the early bird that catches the worm; honesty is often profitable, but we are reminded that virtue is, after all, its own reward; small vessels should be careful, but we are also admonished that 'faint heart never won fair lady'; and correct habits of living, however commendable, are not supposed to invalidate the maxim that a fool and his money are soon parted. Each maxim has a nucleus or core of truth; as we say, there is 'something in it'; but we are not sure of its precise extent or of the conditions under which it holds true. They are all *general*, in the sense that they refer to an indefinite number of cases; but they are not *universal*, because they do not apply to each member of their respective classes. Their indefiniteness is due

to the fact that the conditions are too complex to permit us to subdivide the class in such a way as to mark off clearly the range of applicability.

This being the case, common sense is obviously justified in not attempting to express itself in such a way that the range of application of every statement shall be clear. As we have learned before, we must be content with generalities of undefined range, with statements of uncertain import. Unless we are prepared, whether in speaking or in listening, to take something for granted, to assume qualifications that are not expressed, rational conversation is out of the question. It is characteristic, however, of a certain type of mind that it cannot let these vague generalizations alone. It undertakes the impossible task of specifying the range of their application; an undertaking which results simply in an elaboration of the obvious, with no significant limitation of range. The following summary of a dissertation by a village wise-acre is fairly typical: "Impulsiveness is bad. Of course, there may be occasions, as in a railroad wreck, when quick action is desirable; but a man must not be *too* impulsive; he must not be impulsive when coolness and reflection are required." Precisely. The limitation is so true as to be a truism, which any average person would take for granted. So we are left where we began. The proposition that impulsiveness is bad is not absolutely true, nor is it so intended. But how far it is true or what kinds of impulsiveness are bad, we know now as little as before.

"When two minds of a high order, interested in kindred subjects, come together, their conversation is chiefly remarkable for the summariness of its allusions

and the rapidity of its transitions. Before one of them is half through a sentence the other knows his meaning and replies. Such genial play with such massive materials, such an easy flashing of light over far perspectives, such careless indifference to the dust and apparatus that ordinarily surround the subject and seem to pertain to its essence, make these conversations seem true feasts for the gods to a listener who is educated enough to follow them at all. His mental lungs breathe more deeply, in an atmosphere more broad and vast than is their wont. On the other hand, the excessive explicitness and shortwindedness of an ordinary man are as wonderful as they are tedious to the man of genius. But we need not go as far as the ways of genius. Ordinary social intercourse will do. There the charm of conversation is in direct proportion to the possibility of abridgment and elision, and in inverse ratio to the need of explicit statement. With old friends a word stands for a whole story or set of opinions. With new-comers everything must be gone over in detail. Some persons have a real mania for completeness, they must express every step. They are the most intolerable of companions, and although their mental energy may in its way be very great, they always strike us as weak and second-rate. In short, the essence of plebeianism, that which separates vulgarity from aristocracy, is perhaps less a defect than an excess, the constant need to animadvert upon matters which for the aristocratic temperament do not exist." *

Having said this much, however, in justification of common usage, we may now urge the dangers

* James, *Psychology*, Vol. II., p. 370.

that this usage involves. If some one cites one of these vague generalizations in support of some view that he upholds, the absence of a qualification may prevent both him and ourselves from seeing that he is committing a fallacy of accident. Thus a measure which is intended to correct an evil may be opposed on the ground that 'men cannot be made moral by legislation.' This contention undoubtedly contains an element of truth. However correct a measure may be from the point of view of morality, its wisdom may be doubted, if the moral standard which it sets up is too greatly divergent from that of the people at large, or if the law cannot be sufficiently enforced, because it deals with matters that are not a proper concern of legislation. But on the other hand, it could hardly be maintained that laws have nothing to do with public morality. If the objection to the proposed measure is to apply, it must be shown that the measure is of some such character as just indicated. Otherwise, we merely take advantage of the vagueness to assume that the case under discussion falls within the scope of the generalization, i.e., we take the statement more literally than was intended.

The manner in which such a confusion may be made to serve some special purpose may be shown further by a passage from a lawyer's plea before a jury:

"What is a reasonable doubt? The term seems to define itself in its own words. A reasonable doubt is a doubt which any reasonable man may have. You are all reasonable men, and whenever you doubt you can say that it is a reasonable doubt, the benefit of which the law says you must give to the defendant."

While a reasonable doubt may, if we choose, be described as 'a doubt which any reasonable man may have,' this must be understood in the sense that it is the doubt of a reasonable man, in so far as he is reasonable. This qualification, however, is ignored when it is asserted that "whenever you doubt you can say that it is a reasonable doubt." The most reasonable of men may have unreasonable doubts, and if such doubts were to receive serious consideration the intention of the law would, in many cases, be set at naught.

Essentially, the same considerations apply to all cases in which a proverb or maxim is made to cover an individual instance. It is plain that a detached statement may give little indication of its real meaning. We do not always say just what we mean or mean what we say. How much scope is left to individual interpretation appears rather strikingly in connection with the various constructions that have been placed upon certain passages of Scripture. "If thy right hand offend thee, cut it off," has occasionally been taken literally; "Thou shalt not kill," has been construed in the sense of vegetarianism; "Sell all that thou hast and give it to the poor," has been regarded as a behest to shun earthly possessions; "Let your words be yea, yea, and nay, nay," has been considered a condemnation of all oaths; "Turn the other cheek," has been understood as incompatible with going to war; and the passage, "Therefore art thou inexcusable, O man, whosoever thou art that judgest," was once cited, some years ago, as the basis of a conscientious scruple against service on a jury.

Absolute and Relative Terms.—A second form of ambiguity we may call for convenience the fallacy of relative terms. There are many terms like father and son, husband and wife, landlord and tenant, host and guest, which derive their meaning from their relations to each other, and which reveal their character of relativity by the way they go in pairs. Such pairs are known as correlative terms. But there are other terms which, though equally relative, conceal their true nature much more effectively, and so may become the source of ambiguity. Words like 'poverty,' 'wealth,' 'luxury,' and 'rapidity' are examples. We tend to think of these as 'absolute' terms, i.e., as terms which have a more or less fixed and independent meaning, like 'gold,' or 'planet,' or 'tree.' As a matter of fact, however, they likewise derive their meaning from certain relations, or from a comparison which they presuppose. For this reason their import changes with a change in the things compared. A relative term, therefore, is a term that implies a reference to a variable standard. What is wealth for one person is not necessarily such for another; and what is luxury for one generation may be classed with the necessities of life by the next. A 'comfortable income' is not a fixed quantity, but is a name for a certain relation between our actual income and our demands and desires. This fact is recognized in the humorous suggestion that a comfortable income is 'a little more than we have.' If, however, this dependence on a varying standard is overlooked, the door is opened to ambiguity. Thus the previous argument, to the effect that the evils of life, being transitory, do not require serious

thought, turns on the ambiguity of the word 'transitory,' which is a purely relative term, i.e., implies different standards in different connections.

To recognize and point out this character of relativity may on occasion serve to forestall much fruitless argument. For example, the question may be asked, "Are the people of the present day more moral than those of the past?" Before we undertake to express an opinion we should ascertain what is meant by 'more moral.' To judge the past by present-day standards is one thing; to judge it by its own standards is quite another. Again, the question may be raised whether or not students who go into business are as a rule more capable than those who adopt the profession of teaching. Discussions of a question like this are prone to overlook the relativity of a phrase like 'more capable.' Until we specify whether we mean 'capable for business' or 'capable for teaching' or some other form of capableness, argument is likely to be futile.

Parallel cases are found in questions like, "Which are the hundred best books?" or "Who are the ten greatest Americans?"—questions that cannot be answered until we know by what standards our judgments are to be determined. Literary excellence is one thing, scientific is another, and moral excellence is a third. The term 'drunk' is another instance. Although easily overlooked in everyday life, the relativity of this term is well known in police courts. It is applied to widely different forms or stages of inebriety, the range of which is indicated by the classification of an ingenious lawyer who distinguished the different stages of drunkenness as the jocose, the

verbose, the bellicose, and the comatose. These different stages may or may not be all included. An editor writes thus regarding "Standards of Drunkenness":

"A correspondent of one of the Toronto newspapers points out that on Christmas day in Toronto, which has 150 places to sell liquor, there were 109 persons arrested for drunkenness, while in Buffalo, which has over 3,000 barrooms, there were only thirty-nine arrests. The intention was to prove that the number of licensed places has no effect upon the amount of drunkenness. It cannot be accepted as conclusive evidence, for the police standards of what constitutes drunkenness may differ in the two cities. In Buffalo the citizen who confines himself to getting drunk is probably allowed to go as soon as he is sober, without a charge being entered against him, while in Toronto he is fined. There is no poorer standard of estimating the sobriety of a city's population than by its convictions for drunkenness."

Concrete and Abstract Terms.—The confusion of concrete and abstract is a form of ambiguity that has been the source of much trouble. We may distinguish most conveniently between concrete and abstract terms by saying that concrete terms are the names of things, while abstract terms are concerned with attributes. The term attribute is here used as inclusive of all the qualities, relations, and actions pertaining to things. It is a peculiarity of abstract terms that they can be used without reference to the subjects which possess the attributes designated by them. Thus we can speak of squareness or redness, without mention of the things to which these attributes belong. Such terms tend to divert our attention from reference to

things, and for this reason they are called abstract. Judged by this test, adjectives and verbs, as used in propositions, are always concrete, since they point out the possessors of the attributes indicated by them. If we say 'the horse runs,' or 'the horse is black,' our language is concrete; but if we wish to speak of the attributes indicated by 'runs' and 'black,' without reference to the horse, we are obliged to employ nouns, such as 'running' and 'blackness.' Abstract terms, then, are names which designate attributes and which function as nouns.

Since attributes may be mentioned without reference to the subjects or things to which they belong, abstract terms have a certain resemblance to individual or proper names. We speak of 'virtue' and 'justice,' for example, in much the same way that we speak of the Japanese navy or John Smith. Now if we take no pains to bear in mind their true character, these abstract terms may on occasion masquerade as the names of things, and perhaps even assume the dignity of a capitalized initial, as in, "We come down then, finally, to Force as the ultimate of ultimates."* The fallacy that is committed when we mistake the character of abstractions in this way, may be called indifferently the fallacy of abstract terms, the fallacy of confusing the abstract and the concrete, or the fallacy of hypostatization. This error is much more frequent than we should naturally suppose. Many persons, for instance, would consider it a sufficient explanation of the movements of raindrops to say that gravitation causes them to fall. But if we remember that gravitation is the name of an at-

* Spencer, *First Principles*, Part II., Chapter III.

tribute, we are enabled to see that the reference to gravitation means merely that raindrops belong to the class of gravitating bodies. *Why* they gravitate is as much a problem as it was before. The semblance of explanation arises from the fact that we hold the attribute 'gravitation' apart from the objects to which it belongs and treat it as though it were some sort of entity endowed with power to act.

Our everyday use of such terms as 'conscience,' 'memory,' and 'will,' shows further how ingrained is this habit of treating abstractions as though they were independent things. In reality these terms are the names of attributes. It is not uncommon, however, to find that conscience, for example, is conceived, in a vague fashion, as though it were some kind of thing, inhabiting the inmost recesses of the soul and performing the functions of an oracle. Similarly, there is no separate thing called memory or will, but only different instances of remembering and willing. Sometimes abstractions are used to back up beliefs which we are predisposed to accept. A man who has committed theft may argue that the world owes him a living; the precise meaning of which is not so apparent, when we try to make clear what is meant by 'world.' Or a man who is unwilling to make sacrifices in order to promote the public welfare, may insist that the evils which are causing concern will disappear of themselves in the course of progress, as though progress were a distinct sort of agency, and all we need to do is to sit down and wait while 'progress,' like the Brownies or the 'Gold Dust Twins,' does our work. Or again, the sentiment that "a corporation has no soul" may sometimes seem to an indi-

vidual to justify a certain act, such as failure to pay for transportation, which would not be thought of if the other party concerned were the driver of a hack.

It is perhaps worth while to guard against the inference that the use of abstract terms is objectionable on all occasions. As a matter of fact, their abstract character is frequently their chief merit, since it simplifies thought and speech. Their abstractness becomes a defect only when there is danger of confusion. Whenever this occurs, the remedy applied to other forms of ambiguity is always to be recommended, viz., the substitution of other terms for those which are under suspicion. In the present case the substitution should be of such a kind as to indicate the reference that the abstract term implies, i.e., it should point out the subject to which the attribute belongs. This subject may be either a thing or another attribute. Instead of 'truth,' for example, we should say 'truthful person' or 'truthful statement,' or whatever the meaning may happen to be; for 'gravitation' we should substitute 'gravitating bodies,' and so on. In short, if there is ground for suspicion, the abstract term should be used as an adjective, and not as a noun. Under this treatment statements which seem significant and even profound, not infrequently dwindle down to a mass of verbiage. The reader can easily ascertain this for himself by making the proper substitutions in the following extract from a circular of healing: "You have believed a lie that you cannot get well. The truth will make you free. Love Nature. She is gentle and holy. To obey her is to live. . . . Animals respond quickly to my vibrations because they are near to nature's heart."

CHAPTER V

THE NATURE AND THE INTERPRETATION OF PROPOSITIONS

Our chief interest in the preceding chapters has been the nature of terms in their relation to ambiguity. It has appeared that ambiguity consists in the neglect of distinctions which are required in the given situation. As a rule, ambiguity means that a statement which holds good for some members of a class is made to apply to other members as well. In other words, our discussion has been confined, in the main, to fallacies. We have not yet raised the question what the relation of classes must be to each other in order to make correct inferences possible. The traditional doctrine which sets forth the principles of this relationship is known as the doctrine of the syllogism.

The syllogism, which was first formulated by Aristotle and which was brought to a high degree of perfection during the Middle Ages, is of considerable interest, owing to the great importance that was attached to it. This attitude, however, has undergone a change, and opinions as to the value of the syllogism are divided. But whether its value be great or small, it is of sufficient importance, both historically and intrinsically, to warrant some attention. The character of the syllogism will be taken up in detail

in succeeding chapters. Since the syllogism is somewhat technical, the present chapter must be devoted to a discussion of propositions from the standpoint of syllogistic logic. The special bearing of this discussion will appear at a later time.

Judgment and Proposition.—The first distinction that requires our notice is the distinction between judgment and proposition. As was stated previously, a judgment is a mental assertion of something as true or untrue, while a proposition is the expression of the judgment in words. A proposition, therefore, is a sentence. Not all sentences, however, are propositions. Interrogations, for example, and exclamations are not propositions, because they do not express judgments in any direct way. Moreover, sentences which are the direct expression of a judgment frequently require verbal changes in order to reduce them to 'logical form.' By logical form is meant that the proposition in question possesses two terms and a copula or connecting link. The terms are the subject term and the predicate term respectively; the copula is some form of the verb 'to be.' Thus the proposition, 'All Presidents have great responsibilities,' when reduced to logical form, becomes, 'All Presidents are persons who have great responsibilities.' In this latter proposition 'Presidents' is the subject term, 'are' is the copula, and 'persons who have great responsibilities' is the predicate term. This form sometimes gives a stilted appearance to a proposition, as, e.g., when 'all the papers published the event' is changed to, 'all the papers are things which published the event'; but its convenience for the purpose of the syllogism will soon become apparent.

Categorical and Conditional Propositions.—A proposition is said to be categorical if it makes an assertion without condition or alternative. ‘He went to Boston,’ and ‘It will rain before night,’ are examples. On the other hand, conditional propositions make assertions that are true only indirectly, i.e., they assert something to be true, provided something else is also true; or, to put it still differently, they assert something as *conditionally* true.

Of these conditional propositions there are two kinds, the hypothetical and the disjunctive. The hypothetical proposition expresses a condition and a result directly, such as ‘If he comes, there will be trouble.’ In the case of disjunctive propositions, the conditional character takes a different form. This character consists in the fact that one or the other of two or more specified alternatives is asserted to be true, as, e.g., ‘He will either come or send a representative.’ The assertion of these alternatives is not made directly, but each alternative is conditioned, as to its truth or untruth, by the untruth or truth of the other. As will appear later on, the distinction between categorical and conditional propositions corresponds to a distinction between two kinds of syllogism. For the present we shall confine our attention to the categorical proposition and to the kind of syllogism for which the categorical proposition furnishes the basis.

The Quality and Quantity of Propositions.—By the quality of a proposition is meant its character as affirmative or negative. An affirmative proposition asserts that something is true of the subject named, e.g., ‘America was discovered in 1492.’ In a negative

proposition something is denied of the subject, as in, 'The revolution was not successful.' The quantity of a proposition, on the other hand, depends upon the extension of the subject term. If the proposition concerns the entire class pointed out by the subject term, e.g., 'all trespassers will be prosecuted,' the proposition is said to be *universal*; if it concerns only some members of that class, as in, 'Some men have greatness thrust upon them,' it is called *particular*. Propositions which refer to a single person or thing, as 'Socrates was a Greek,' or 'the earth is round,' are sometimes called singular or individual propositions. For syllogistic purposes, however, such propositions are of the same kind as universal propositions. Both refer to an entire class, but in the case of individual propositions the class happens to contain only a single member.

Propositions which are of indefinite application, of the sort typified in popular maxims, are from the present point of view classed as particular propositions. From the standpoint of the syllogism the distinction between the universal and the general is not recognized, but all propositions that do not apply to an entire class are classified as particular propositions. Finally, it must be added that propositions sometimes show a discrepancy between form and meaning, with regard to both quantity and quality. 'All is not gold that glitters' is universal in form, but particular in meaning, the meaning being, 'some things that glitter are not gold.' On the other hand, propositions beginning with 'only' or 'none but' are particular in form but universal in meaning. Thus 'only lawyers are admitted' means, not merely that

some lawyers are admitted, but that all who are admitted are lawyers. As to quality, 'few escaped' means that most did not escape; and 'none but friends were present,' means that all who were present were friends.

We have seen that propositions may be either affirmative or negative as to quality, and either universal or particular as to quantity. We thus have four possible kinds of propositions, which may be represented by the letters A, E, I, and O. A and I—taken from the word *affirmo*—stand for affirmative propositions; while E and O—from *nego*—stand for negative propositions. These four forms are as follows:

Universal	{ Affirmative: All S is P.	A
	{ Negative: No S is P.	E
Particular	{ Affirmative: Some S is P.	I
	{ Negative: Some S is not P.	O

The Distribution of Terms.—If a proposition makes an assertion about an entire class, the term which designates that class is said to be *distributed*, whereas if the assertion refers to some members of the class only, it is *undistributed*. It should be noted that the distinction between universal and particular concerns propositions, while the distinction between distributed and undistributed has to do with terms. Thus a proposition may contain both a distributed and an undistributed term. For example, in proposition A, 'All men are fallible,' the subject term 'men' is distributed, because something is said of all men; whereas the predicate term 'fallible' is not dis-

tributed, since nothing is said about all fallible beings. In proposition I, 'Some men are fallible,' neither term is distributed. On the other hand, proposition E, 'No men are infallible,' distributes both terms, for it tells us something about all men, viz., that they all fall outside the class of infallible beings, and with regard to infallible beings it informs us that they all fall outside the class of men. Lastly, proposition O, 'Some men are not infallible,' does not distribute its subject, since it speaks of some men only; but it does distribute its predicate, because it assures us that the entire class of infallible beings falls outside of some men. This may be stated less artificially if we say that in order to make the assertion, 'Some men are not infallible,' we must know enough about the class of infallible beings to feel sure that none of them are identical with some men. In general we may say that negative propositions always distribute their predicates; whereas affirmative propositions do not distribute their predicates.

The Obversion and Conversion of Propositions.—

The processes of obversion and conversion require us to recall the distinction between the judgment and the proposition. It appeared in connection with our study of the fallacy of accident that the two are not coincident. A proposition is, in fact, but one of the various possible ways in which the corresponding judgment might be expressed. The assertion embodied in the proposition, 'The book is on the table,' also means that the table is under the book, although the proposition does not provide for this aspect of the case. Similarly, if A is east of B, then B is west of A; if John is the son of James, then James is

the father of John; if all Presidents are native-born citizens, then some native-born citizens are Presidents, and there are no Presidents who are not native-born, and no persons not native-born who are President; if William is riding the horse on the street, then the horse is being ridden by William, and the street is the place where the riding is taking place. Even a proposition like, 'it rains,' may be changed and rendered, 'the rain is falling.' Every fact that is asserted is more or less complex, and the proposition may, therefore, be varied so as to bring out or emphasize one element rather than another, although all are involved.

What variations are possible in any given case depends upon the nature of the fact concerned and cannot be completely determined in advance. There are, however, two forms of variation that can be studied independently of any subject-matter. These two forms are known as *obversion* and *conversion*.

Obversion is a name for the process by which a proposition undergoes a change in its quality, i.e., a change from affirmative to negative or from negative to affirmative, without any change in its meaning. This occurs, for example, when a proposition like, 'all men are fallible,' is changed to, 'no men are infallible,' or when we change 'no foreign-born are eligible' to 'all foreign-born are ineligible.' The principle of obversion is that instead of affirming a predicate as true of a subject, we may deny its negative; and instead of denying the predicate we may affirm its negative. To exemplify this process, let us take the proposition, 'All the buildings suffered damage.' When reduced to logical form this proposition be-

comes, 'All the buildings are structures that suffered damage.' The negative of this predicate is, 'structures that did not suffer damage.' Denying this negative we have, 'The buildings are not structures that did not suffer damage,' or 'None of the buildings are structures that did not suffer damage.'

If the proposition to be obverted is negative, we take the negative of the original predicate and affirm it of the original subject. To illustrate this, let us first expand the proposition, 'No Presidents are care-free,' into, 'No Presidents are persons who are care-free.' The negative of this predicate is 'persons who are not care-free.' This negative must be affirmed of the subject 'Presidents' and we have, 'All Presidents are persons who are not care-free,' which is the obverse of the original negative proposition. The process of obverting the statement, 'Some planets are not inhabited,' may be traced thus: The original negative proposition may be expanded into, 'Some planets are not heavenly bodies which are inhabited.' The negative of the predicate is, 'heavenly bodies which are not inhabited.' According to the rule laid down in the second part of the principle for obversion, we must now take this negative of the original predicate and affirm it of the original subject. As a result we have, 'Some planets are heavenly bodies which are not inhabited.' By obverting this latter proposition once more, we get back to the original form, viz., 'Some planets are not heavenly bodies which are inhabited,' or, 'Some planets are not inhabited.'

Conversion means a change in the form of a proposition whereby the subject term and the predicate term exchange places with each other, but without going be-

yond the meaning of the proposition. Thus the proposition, 'Some Americans are inventors,' may be changed to, 'Some inventors are Americans.' In this particular case the process is extremely simple, but this is not always the case. Conversion may be of three kinds: (a) Simple conversion; (b) Conversion by limitation or *per accidens*; and (c) Conversion by contraposition. These different forms result from the fact that, according to the rule which governs conversion, no term which is undistributed in the original proposition may be distributed in the new proposition which is obtained as a result of the conversion.

Of these three forms the first, viz., simple conversion, is illustrated in the change of 'Some Americans are inventors' to 'Some inventors are Americans' (Proposition I). The terms involved are undistributed in the second proposition as well as in the first. Proposition E, 'No men are quadrupeds,' may likewise be converted simply. In the resulting proposition, 'No quadrupeds are men,' both terms are distributed, but since they were both distributed in the original proposition, the rule is not violated. In order, however, to convert proposition A, 'All men are animals,' we must convert by limitation. We cannot say, 'All animals are men,' but 'Some animals are men,' because the terms 'animals' is undistributed in the original proposition. In this form of conversion proposition A is changed to proposition I. We change from a universal to a particular proposition, and for this reason the process is called conversion by limitation. " 'Brethren,' said Parson Strong, of Hartford, preaching a Connecticut election sermon, in high party times, some fifty years ago, 'it has been charged that

I have said every Democrat is a horse-thief. I never did. What I *did* say is only that every horse-thief is a Democrat, and *that* I can prove.' " *

The most complex form of the three is conversion by contraposition. Proposition O, 'Some men are not quadrupeds,' cannot be converted simply to 'some quadrupeds are not men,' for the proposition obtained by conversion distributes the term 'man,' which was not distributed in the original proposition. Both propositions happen to be true, but they are not equivalent to each other. This appears if we substitute as a parallel case, 'Some men are not Presidents,' and convert it to 'Some Presidents are not men.' The only way in which the conversion of proposition O can be accomplished is by first obverting it and then converting the result. 'Some men are not quadrupeds' then becomes, first, 'Some men are beings that are not quadrupeds,' and this in turn gives us, by conversion, 'Some beings that are not quadrupeds are men.' This process is called conversion by contraposition.

False Obversion.—In true obversion the negative (i.e., the contradictory) of the original predicate is affirmed or denied respectively of the original subject. In such obversion the meaning remains the same, for the reason that two negatives constitute an affirmative. We may either affirm a predicate of a subject or deny its negative of the same subject, as we please. We cannot, however, take the same liberties with the subject. One might suppose that it would be equally permissible to take a proposition in which the predicate is affirmed of the subject and obvert it by denying

* J. Parton, *Smoking and Drinking*, p. 34.

this same predicate of the *negative of the subject*, but this is not the case. A concrete instance in which such an obversion is involved is furnished in the following inference:

“ The agreement of the representatives of the great European powers in session at the Hague (June, 1899), in favor of a reduction of standing armies would produce a lasting benefit to civilization, if it could be determined on; but as there is little likelihood of such agreement, we may infer that no benefit to civilization will ensue.” *

In this argument it is asserted (1) that a Conference which resulted in the agreement of the powers to reduce standing armies would be a benefit, and (2) that this Conference will not result in such an agreement. From these two propositions it is inferred that no benefit will result. It is plain, however, that this conclusion is not warranted. The Conference may be a benefit for other reasons. In order to justify the conclusion, we must take the first statement as equivalent to, ‘ A Conference that does not result in the agreement of the powers to reduce standing armies will not be a benefit.’ That is to say, the obversion is accomplished by denying the predicate of the negative of the subject. The two propositions, however, are not equivalent to each other and the inference, therefore, involves a false obversion.

Correct obversion, it will be seen, requires that our manipulations be confined to the predicate of the proposition which is to be obverted. An obversion

* Newspaper clipping, quoted by Lafleur, *Illustrations of Logic*, No. 174.

which involves the negative of the subject is a false obversion. We may take as our next illustration of false obversion a proposition which in its original form is negative. This proposition is taken as equivalent to a proposition in which the predicate is affirmed of the negative of the subject. The fallacy occurs in the following argument:

“No trifling business will enrich those engaged in it; a mining speculation is no trifling business; therefore a mining speculation will enrich those engaged in it.” (Whately.)

While this reasoning is not likely to mislead, because our knowledge of the facts warns us against the conclusion, we may be a little puzzled to account for the seeming coherence of the argument. Analysis shows that this apparent coherence is due to a false obversion, ‘No trifling business will enrich those engaged in it’ being taken as equivalent to, ‘A business that is not trifling will enrich those engaged in it.’ If we grant the truth of this false obverse, then it is true that a mining speculation, which is a business that is not trifling, will enrich those engaged in it. The obversion, however, is false, for it assumes that a statement about ‘trifling business’ warrants a statement about something entirely different, viz., about a ‘business that is not trifling.’

False Conversion.—It was pointed out that in conversion terms which are undistributed in the original proposition must remain undistributed in the proposition derived by conversion. If the second proposition distributes a term which in the first is not distributed, the scope of that term is extended, which is obviously not permissible. False conversion has to do with

errors in distribution. The following argument is a case in point:

“ When we say that ‘ the murderer deserves death,’ are we quite sure that we are right as to the fact? Perhaps he may be *insane*; does he deserve death then? . . . To kill oneself is no better than to kill a fellow-creature; and if temporary insanity be the proper verdict in the one case, why should it not also be proper in the other? Both crimes indicate insensibility to consequences; and what is insensibility to consequences but insanity itself? To us the deed of murder seems so intensely unnatural, so horrible, so awful, that we can only suppose it to be the frenzied conception of a mind violently wrenched from its propriety and responsible to no moral tribunal but the Eternal one.” *

In this argument it is asserted that ‘ Insensibility to consequences is insanity,’ and that the murderer is, therefore, to be considered insane. The only reason, however, that is offered for this opinion is that the crime is ‘ so intensely unnatural.’ This is hardly conclusive evidence. It seems likely that to the writer the assertion appeared plausible, because ‘ Insensibility to consequences is insanity ’ is not clearly distinguished from ‘ Insanity is insensibility to consequences.’ The latter of these propositions is presumably true, but does not suffice to give the conclusion; the former does suffice for the conclusion, but its truth is not above suspicion. The two propositions are easily taken as identical, because we tend to pass from ‘ Insanity is insensibility to consequences ’ to ‘ Insensibility to consequences is insanity,’ by simple con-

* *Eclectic Review*, July, 1849, p. 117.

version. The proposition thus converted, however, is proposition A and must be converted by limitation. The true converse, therefore, is, 'Some insensibility to consequences is insanity.' Granted that this proposition is true, it still remains to be determined whether the insensibility to consequences displayed by the murderer is of the kind that is identical with insanity.

The illustration just cited shows, if the interpretation is correct, how easy it is to confuse a meaning which is true, or at least plausible, but which does not give the desired conclusion, with another meaning which does indeed warrant the conclusion, but which is not true, or at least not beyond serious doubt. The fallacy is not likely to occur, as a rule, except when the subject term and the predicate term of the proposition are very nearly co-extensive. "Thus no one would think of converting the proposition, 'All United States Senators are members of Congress,' into, 'All members of Congress are United States Senators,' but many might fall into the fallacy of converting the proposition, 'All the Democrats in the Senate voted against the bill,' into, 'All Senators who voted against the bill were Democrats.' " *

* Hibben, *Logic*, p. 113.

CHAPTER VI

THE CATEGORICAL SYLLOGISM

The Purpose of the Syllogism.—We have found that classification is important for reasoning, because certain qualities or attributes go together or tend to go together. If we have classified correctly, we are enabled to anticipate experience and say in advance, ‘All A is B.’ We know that all fire burns, without first testing every possible case of fire, past, present, and future. Such classification is, indeed, frequently surrounded by danger, as the facts of ambiguity attest. By what methods we verify the correctness of our classifications is a problem of extreme importance, but one that must be postponed in favor of another problem of smaller magnitude. The latter is the special problem of the syllogism, and it raises this question: Assuming that certain propositions are true, i.e., that they are accepted without dispute, how can they be made to support some new proposition? This question presupposes that certain classifications are already at hand, and assumes that they are trustworthy. It thus leaves aside the whole subject of ambiguity, and it does not concern itself to ascertain how our original propositions are secured. Its special function is to determine how given propositions must be related to each other, in order to demonstrate the truth of some new proposition.

It should be noted at the outset that the syllogism does not attempt to tell us how reasoning actually goes on, but how the conclusion that is drawn may be justified or necessitated. It deals with the principles that underlie the process of reasoning, and not directly with the reasoning process itself.

The Definition of the Syllogism.—The stock example of a syllogistic argument is the following:

All men are mortal;
Socrates is a man;
Therefore Socrates is mortal.

This argument, when inspected, is found to consist of three propositions, the last one being the *conclusion*, while the other two are called the *premises*. The premises are merely unsupported assertions and may at times be wrong. The conclusion, on the other hand, does not stand alone, but sustains to the premises a peculiar relation called *validity*. To say that a conclusion is valid is not to say that it is true, but that it must be true if the premises are true. A syllogism, therefore, is sufficiently defined if we say that it “consists of three propositions so related that one of them is involved or implied in the other two.”*

The Parts of the Syllogism.—In order to obtain a valid conclusion, the premises must be related to each other in a certain way. We cannot obtain valid conclusions by combining any two propositions at random. If we had said:

All men are mortal;
Socrates was a Greek;

* Minto, *Logic*, p. 167.

no conclusion could be drawn, because the propositions bear no relation to each other. These two propositions represent a total of four terms, 'men,' 'mortal,' 'Socrates,' and 'Greek.' The previous argument, on the other hand, contains but three terms, viz., 'men,' 'mortal,' and 'Socrates,' the term 'man' being common to both propositions. In order, then, to serve as the premises for a valid conclusion, the propositions in question must have a common term. This common term constitutes a point of relation or of comparison between the two premises. We are enabled to ascertain the relation of the other two terms to each other, because each of them bears a certain relation to the common term. The latter appears in both premises, but does not appear in the conclusion. It is known as the *Middle Term*, because it serves as a connecting link between the two terms that appear in the conclusion. This arrangement shows why the syllogism is sometimes described as a process of comparison.

If we symbolize the subject term of the conclusion by S, the predicate term of the conclusion by P, and the middle term by M, the form of this particular syllogism is as follows:

$$\begin{array}{l} M-P \\ S-M \\ \therefore S-P \end{array}$$

As a matter of terminology we may note that P is known in syllogistic logic as the major term, and S as the minor term; while the premise that contains P is called the major premise, and the one that con-

tains S is called the minor premise. In the arrangement of the three propositions that constitute the syllogism, it is customary to place the major premise first, then the minor premise, and lastly the conclusion. This is sometimes called the 'logical form' of the syllogism. It will be noticed that 'logical form' is a term applied to both propositions and syllogisms. The logical form of the syllogism is not always, or even usually, followed in actual argument, and so if we attempt to reduce an argument to its logical form, it is expedient to pick out first the conclusion, because the conclusion gives us the clue to the major and minor premises. This is exemplified in the following argument: 'He must be a stockholder, for he attended the meeting, and all who attended the meeting were stockholders.' Here the conclusion, 'He must be a stockholder,' stands first. Having discovered the conclusion, we know that the proposition which contains the subject, 'He,' is the minor premise, and that the proposition containing the predicate, 'stockholder,' is the major premise. Properly arranged, therefore, the argument would read:

All who attended the meeting were stockholders;
He attended the meeting;
Therefore, he is a stockholder.

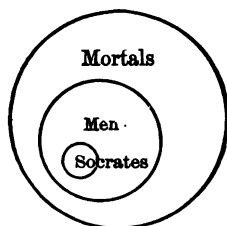
The Inclusion and Exclusion of Classes.—If we inquire into the reason why the two terms of the conclusion are called major term and minor term respectively, we come upon the conception that is fundamental to the categorical syllogism. In this syllogism propositions are regarded solely from the

standpoint of the inclusion and exclusion of classes. So regarded, the proposition, 'All men are mortal,' asserts that the class 'men' falls within the larger class 'mortals'; and the proposition, 'Socrates is a man,' asserts that 'Socrates' is a class which falls within the larger class 'men.' We have, therefore, three classes, 'Socrates,' 'men,' and 'mortals,' and these classes differ in extent or scope. In the typical form of the syllogism, P represents the largest of the classes involved, while S represents the smallest. 'Mortals,' the predicate term, represents a larger class than 'men,' and is hence called the major term; while 'Socrates,' the subject term, represents a smaller class than 'men' and is therefore called the minor term.

In order to carry through consistently this treatment in terms of classes, it is necessary to reduce all propositions to logical form, so as to bring out clearly the relations of the classes. The change in verbal form that is necessary for this purpose may be quite extensive. To take a simple case, if we say, 'Presidents are persons having great responsibilities,' the fact that 'Presidents' constitute a part of the larger class, 'persons having great responsibilities,' is much more clear than if we had said, 'Presidents have great responsibilities.' From the standpoint of classes, 'no men are perfect,' means that the classes 'men' and 'perfect' exclude each other; 'Some men are trustworthy,' means that the class 'men' and the class 'trustworthy beings' overlap in part, that some part at least of the class 'men' falls within the class 'trustworthy beings'; and 'Some men are not trustworthy' means that some part at least of

the class 'men' falls outside the class 'trustworthy beings.'

One advantage of this method of treatment is that these arguments are readily tested by a diagram, since the relations of classes can be easily represented in spatial form. Thus a larger circle to represent 'mortal,' including a smaller circle to represent 'men,' expresses pictorially the proposition, 'All men



are mortal'; and a circle within the second circle symbolizes the proposition, 'Socrates is a man.' The conclusion, 'Socrates is mortal,' signifies that if Socrates is included within the circle of 'men,' he is necessarily included within the larger circle of 'mortals.'

The Rules of the Syllogism.—By resort to diagrams, whenever necessary, we can determine in any specific instance whether a given pair of propositions will serve as the premises for a valid conclusion. Usually, however, a set of rules are offered to which the syllogism must conform. These rules merely formulate what the diagrams or circles may be made to demonstrate. They are as follows:

(1) In every syllogism there should be three and not more than three terms, and these terms must be used throughout in the same sense.

(2) The middle term must be distributed at least once in the premises.

(3) No term must be distributed in the conclusion that was not distributed in one of the premises.

(4) No conclusion may be drawn from two negative premises.

(5) If one premise is negative, the conclusion must be negative.

(6) No conclusion may be drawn from two particular premises.

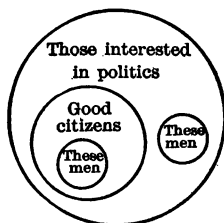
(7) If one of the premises is particular, the conclusion must be particular.

The reason for the first of these rules has already appeared. Unless there are three and only three terms, we have no standard for comparison, i.e., no common point of reference, by which we can determine the relation of the two terms in the conclusion to each other. Inference is consequently impossible. Certain qualifications of this rule will be discussed a little later in this chapter under the heading, 'Sorites.'

The second rule, that the middle term must be distributed at least once, is based upon the fact that the middle term is the medium of comparison for the other two terms. If neither premise makes an assertion about the whole class designated by the middle term, it may happen that one premise applies to one part of that class, while the other premise applies to some other part. This is illustrated in the following syllogism :

All good citizens are interested in politics;
These men are interested in politics;
Therefore these men are good citizens.

It may be, of course, that these men are interested in politics for purely selfish reasons. That the conclusion does not necessarily follow appears from the accompanying diagram. 'These men' may fall either



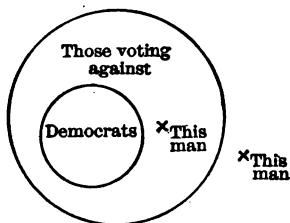
inside or outside the class, 'good citizens.' If we were to perform a false conversion of the major premise and say, 'All who are interested in politics are good citizens,' the conclusion would be valid, but the truth of this new major premise would be more than questionable. A violation of this second rule is known as an *Undistributed Middle Term*, or more briefly, as an *Undistributed Middle*.

The third rule, which forbids us to distribute in the conclusion a term that was not distributed in the premises, implies the obvious truth that if the assertion made in the premises is meant to apply to some part of a class only, it must not be construed in the conclusion as though it applied to the class as a whole. It means that a term must not be used more widely in the conclusion than it was used in the premises. This rule may be violated in connection with either the major or the minor term, and the fallacies which result are known in logic parlance as the *Illicit Process* of the major and minor terms, respectively, or, more briefly, as illicit major or illicit minor.

An example of an illicit major is given in the syllogism below:

All the democrats voted against this measure;
 This man is not a Democrat;
 Therefore this man did not vote against this measure.

The conclusion makes an assertion regarding the whole class of 'Those who voted against this measure,' viz., that the class excludes 'this man.' But, as is shown in the diagram, the fact that 'this man' is outside the

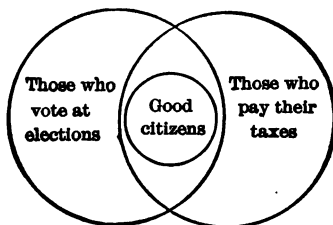


class 'Democrats' does not determine whether he is inside or outside the class, 'Those who voted against this measure.' The inference gains whatever plausibility it may possess from the tacit conversion of the major premise to, 'All who voted against this measure are Democrats.' A diagram will show that if the major is thus converted, the conclusion is valid.

The next argument illustrates the fallacy of illicit minor:

All good citizens pay their taxes;
 All good citizens vote at elections;
 Therefore all who vote at elections pay their taxes.

This inference, as the accompanying diagram shows, is unwarranted. If the premises are true, the two classes



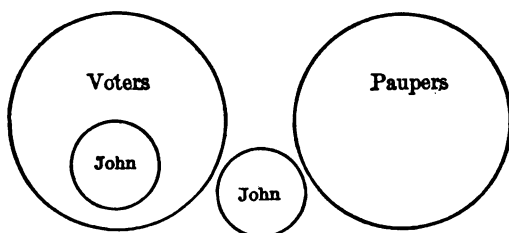
must indeed overlap, and so it must be true that *some* who vote at elections are good citizens. But since the premises say nothing about the whole class of 'those who vote at elections,' we are not permitted to do so in the conclusion. The conclusion is valid only if we convert the minor premise to 'All who vote at elections are good citizens.'

That no conclusion can be drawn from negative premises, as is stated in the fourth rule, is evident if we note that the premises inform us merely that S and P both fall outside of M and thus give us no sort of clue as to the relation which they may sustain to each other. This appears from the following argument:

No pauper has a vote;
 John is no pauper;
 Therefore John has a vote.

If we represent this syllogism by circles, we see that while 'John' is outside the class of paupers, he is not necessarily included in the class of 'those who have a vote.' The appearance of validity seems to be due to

the fact that 'no pauper has a vote' bears a certain resemblance to the proposition, 'Those who are not



paupers have a vote,' i.e., there is a certain temptation to perform a false obversion.

The rule that two negative premises cannot yield a valid conclusion is apt to mislead occasionally, unless we distinguish between propositions which are negative in form only and those which are negative in meaning. The following is an example of a syllogism that appears to have two negative premises but nevertheless permits us to draw a valid conclusion:

Nobody who is not thirsty is suffering from fever,
 This person is not thirsty,
 Therefore this person is not suffering from fever (Minto).

This is a valid conclusion, for the reason that the inference is based not upon any assigned quality, but upon the absence of a quality, viz., 'thirsty.' The major is equivalent to 'Wherever thirst is absent fever is absent.' Such a syllogism can be made correct in form by making the minor premise read, 'This person is one who is not thirsty.' The 'not' is thus made to belong to the predicate and not to the copula.

The remaining rules may be dismissed more briefly. Rule five, which states that if one premise is negative the conclusion must be negative, is necessarily true, because under such conditions one of the other two terms agrees, while the other does not agree, with the middle term. Hence the two do not agree with each other, i.e., the conclusion must be negative. The sixth and seventh rules are based upon the fact that [as stated in rules (2) and (3)], the middle term must be distributed at least once, and that no term must be distributed in the conclusion if it was not distributed in the premises. It will be found that if both premises are particular one or the other of these two rules is violated, and that the same is true if we attempt to draw a universal conclusion when one of the premises is particular.

The Figures of the Syllogism.—By ‘figure’ is meant the form or arrangement of the syllogism as determined by the position of the middle term. Since the middle term may function in the premises as either the subject or the predicate, four arrangements or forms are possible. These arrangements are exemplified in the following syllogisms:

FIGURE I

All men are mortal;	M—P
Socrates is a man;	S—M
Therefore Socrates is mortal.	∴ S—P

FIGURE II

All men are mortal;	P—M
Inanimate beings are not mortal;	S—M
Therefore inanimate beings are not men.	∴ S—P

FIGURE III

All men are mortal;	M—P
All men are fallible;	M—S
Therefore some fallible beings are mortal.	∴ S—P

FIGURE IV

All men are mortal;	P—M
All mortals are fallible;	M—S
Therefore some fallible beings are men.	∴ S—P

In the first figure the middle term is the subject of the major premise and the predicate of the minor premise. In the second figure it is the predicate of both premises. In the third figure it is the subject of both premises. In the fourth figure it is the predicate of the major premise and the subject of the minor premise. It may be remarked that while the fourth figure is theoretically possible, it is of no particular practical importance and is not recognized in Aristotle's doctrine of the syllogism.

Reduction.—The first figure was regarded by Aristotle as the most direct and convincing, and was called by him the perfect figure. In the first figure the major premise is a universal proposition, and the minor points out something which this universal includes. The other figures were called the imperfect figures, and the process of changing these to the first figure is called *reduction*. Elaborate rules governing the process of reduction were formulated during the Middle Ages. Reduction is accomplished through certain processes of obversion and conversion, and through the transposition of the premises whenever necessary. The syllogism, for example, in the third

figure above, may be reduced to the first figure by simply converting the minor premise so as to make it read, 'Some fallible beings are men'; and the syllogism in the fourth figure may be reduced by transposing the premises and converting the conclusion. Reduction is of interest chiefly because it shows that whenever we put an argument in the form of a syllogism, the particular form of syllogism that we adopt is more or less a matter of accident.

Sorites, or Chain of Reasoning.—A Sorites is a chain of reasoning in which the two terms of the conclusion are united through the mediation of more than one intervening or connecting term. It may assume either of the two following forms:

I

A is B;	All negroes are men;
B is C;	All men are vertebrates;
C is D;	All vertebrates are animals;
D is E;	All animals are mortal;
∴ A is E.	∴ All negroes are mortal.

II

D is E;	All animals are mortal;
C is D;	All vertebrates are animals;
B is C;	All men are vertebrates;
A is B;	All negroes are men;
∴ A is E.	∴ All negroes are mortal.

It is possible to treat a Sorites as an abbreviated form of syllogistic inference, because the chain of reasoning may be resolved into a series of syllogisms, each of which, except the last, yields a conclusion

that serves as a premise in the succeeding syllogism. From this point of view, the first of the above inferences is equivalent to three complete syllogisms, as follows:

I	II	III
B is C;	C is D;	D is E;
A is B;	A is C;	A is D;
∴ A is C.	∴ A is D.	∴ A is E.

Inferences in Quantitative Relations.—Certain inferences that deal with quantitative relations give valid conclusions, in spite of the fact that they seem to violate the rules of the syllogism. The following are examples:

I
A is greater than B;
B is greater than C;
∴ A is greater than C.

II
A is north of B;
B is north of C;
∴ A is north of C.

In form these arguments are exactly the same as:

A is the landlord of B;
B is the landlord of C;
∴ A is the landlord of C.

Yet this latter conclusion does not follow from the premises. All of these syllogisms, it will be noticed,

have four terms. What requires explanation, therefore, is the fact that, in spite of this apparent irregularity, it is possible to draw valid conclusions when the subject-matter concerns relations of quantity.

The explanation of this fact is, in brief, that the valid conclusions are possible because they rest upon a true major premise which does not appear in the argument. If A is north of B, and B is north of C, we can infer the relation of A and C, because we are familiar with the nature of space relations. To state the law or the generalization which underlies the inference is a matter of some difficulty. According to some writers the inference, in correct syllogistic form, would read about like this:

Whatever is north of that which is north of another
is north of that other;

A is something that is north of that which is north of C;
∴ A is north of C.

It is true that we never formulate the major premise of this inference, and that we usually do not even suspect its presence. But, as we shall see a little later (see Chapter VIII), the suppression of one of our premises is a frequent occurrence in everyday reasoning. This major premise is not formulated, just because the relationship which it expresses is so simple and obvious. This relationship is peculiar to the realm of quantity, and so the recognition of this relationship enables us to make inferences in this realm which have no precise parallel in other fields.

CHAPTER VII

HYPOTHETICAL AND DISJUNCTIVE SYLLOGISMS

In a previous chapter propositions were distinguished as categorical and conditional. The latter kind again presents two forms, the hypothetical and the disjunctive. Corresponding to the two kinds of conditional propositions, we have two kinds of conditional syllogisms, the hypothetical and the disjunctive syllogism, just as the syllogism discussed in the preceding chapter corresponds to the categorical proposition.

The Hypothetical Syllogism.—It was pointed out that the hypothetical proposition expresses a condition and a result, e.g., ‘ If it storms, the boat will capsize.’ The part that expresses the condition, ‘ if it storms,’ is called the antecedent; the part that expresses the result, ‘ the boat will capsize,’ is called the consequent. The reason for this distinction will appear in a moment.

In hypothetical syllogisms both hypothetical and categorical propositions are employed. The hypothetical syllogism consists of a hypothetical major premise and a categorical minor premise. The following is an example:

If the strike has been called off, the men are back at work;
The strike has been called off;
Therefore the men are back at work.

In this case the minor *affirms the antecedent*. A valid conclusion may also be drawn if the minor *denies the consequent*, as in :

If the strike has been called off, the men are back at work;
The men are not back at work;
Therefore the strike has not been called off.

These two illustrations represent the gist of the hypothetical syllogism. The rule that governs this syllogism is: The minor premise must *either affirm the antecedent or deny the consequent*. If the antecedent exists, the consequent must also exist. Conversely, if the consequent does not exist, it follows that the antecedent, which it invariably accompanies, does not exist either.

Error arises if we attempt to draw conclusions from a syllogism in which the minor premise *denies the antecedent or affirms the consequent*. Thus with the same major premise as above, and with the minor, 'The strike has not been called off,' we cannot infer that the men are not back at work, for they may have returned to work without the formality of calling off the strike. If we ignore this possibility, we commit the fallacy of denying the antecedent. Nor can we draw a valid inference with, 'The men are back at work,' as a minor. If we conclude from this that 'the strike has been called off,' we again overlook the possibility which has just been mentioned. This fallacy is the fallacy of affirming the consequent.

It should be noticed that the antecedent may be affirmed by a minor premise which is negative in form

and that the consequent may be denied by a minor which is affirmative in form. For example:

If war is not declared commerce will increase;
But war will not be declared;
Therefore commerce will increase.

This minor is affirmative in force, because the absence of a condition, 'war,' asserted by it is a basis for an inference. Or we may say that the absence of war is a state that conditions the increase of commerce. Similarly, in the argument:

If he is the right kind of man he will not use money to secure his election;
But he will use money to secure his election;
Therefore he is not the right kind of man.

the affirmation that he used money is equivalent to a denial that he did not use money, and hence it denies the consequent.

It is evident, if we reflect a moment, that the fallacy of denying the antecedent is in principle the same as that of affirming the consequent. In both cases we disregard the fact that the antecedent is not necessarily the only antecedent upon which the consequent depends. While it may be true, therefore, that if A is B then C is D, it need not be true that if A is not B then C is not D; nor need it be true that if C is D then A is B. If every consequent had but one antecedent, it would not be fallacious to draw a conclusion by denying the antecedent or affirming the consequent.

If we analyze the matter a little further, we find

that these fallacies are both due to false obversion. This can be best shown by an illustration. Suppose we take for major premise the proposition, 'If he is ambitious, he will work.' With either 'He is not ambitious' or 'He will work' as a minor, we cannot draw a conclusion. He may decide to work, because this is a less unpleasant alternative than starvation. Nor can we draw a conclusion by substituting for the original major premise its true obverse, which is, 'If he is ambitious, he is not a person who will not work.' But in case we take the obverse to be, 'If he is not ambitious, he will not work,' we can draw a valid conclusion with either of the above premises as a minor. The conclusion is then valid because, through a false obversion, the original major premise is interpreted as equivalent to something that is entirely different. In this false obversion, ambition is assumed to be the only condition upon which the consequent, 'willingness to work,' is dependent.

The Disjunctive Syllogism.—A disjunctive syllogism is characterized by the fact that its major premise is a disjunctive proposition, while its minor is categorical. The function of the major premise is to state the different alternatives of which one or the other must be true. The minor then either specifies which of the alternatives is true, or it specifies which of the alternatives are not true. In symbolic form the disjunctive syllogism may be expressed as follows:

A is either B or C;	Either A is B or C is D;
A is B;	A is B;
∴ A is not C.	∴ C is not D.

He acquired his money either honestly or by fraud;
He acquired it honestly;
Therefore he did not acquire it by fraud.

It is assumed that the alternatives mentioned in the major premise are exclusive of each other. Unless this is the case, we cannot infer that because A is B it is not C, although we can be sure that if A is not B it is necessarily C. 'He is either a knave or a fool,' is an example. If he is not a knave, he must be a fool, but if we should find that he is a knave, we should have to allow for the possibility that he is a fool as well. This possibility invalidates the following inference:

He is either elected or the ballotbox was stuffed;
He is elected;
Therefore the ballotbox was not stuffed.

It is evident that the alternatives here mentioned do not exclude each other. The candidate might be fairly elected, in the sense that he received a majority of the votes which were cast, but there might be fraud at the same time. If, however, the minor premise denied one of the alternatives, the conclusion would be valid.

The Dilemma.— In practical life a dilemma means any situation that offers two or more alternatives of action, all of which, however, are disagreeable. In logic a dilemma is an argument whose premises are made up of hypothetical and disjunctive propositions. Its major consists of two or more hypothetical propositions, while the minor is a disjunctive proposition. The following is an example:

If A is B, C is D; and if E is F, C is D;
But either A is B, or E is F;
Therefore C is D.

The dilemmatic argument may at times be somewhat more complex, but the principle remains the same. Thus:

If A is B, C is D; and if E is F, G is H;
But either C is not D or G is not H;
Therefore either A is not B, or E is not F.

“If this man were wise he would not speak irreverently of Scripture in jest; and if he were good, he would not do so in earnest. But he does it either in jest or in earnest; therefore he is either not wise or not good.” (Whately.)

In the course of the Lincoln-Douglas debate a question was put by Lincoln to Douglas, as follows: “Can the people of a United States territory in any lawful way, against the wish of any citizens of the United States, exclude slavery from its limits, prior to the formation of a state constitution?” The question may be viewed as the source of a dilemma, both in the practical and in the syllogistic sense of the term. In fact it involved a situation which, syllogistically, comprised more than one dilemma. They may be stated as follows:

I. If Douglas answers yes, he offends the South, and if he answers no, he offends the North;
But he must answer either yes or no;
Therefore he will offend either the South or the North.

II. If Douglas offends the South, he loses the nomination for the Presidency in the next convention; and if he offends the North, he loses the election to the United States Senatorship (and his chances for the Presidency).

But he must offend either the South or the North;

Therefore he loses either the Presidency or the Senatorship.

Or, III. If Douglas offends the South, he cannot become President; and if he offends the North, he cannot become President;

But he must offend either the South or the North;

Therefore he cannot become President.

When rightly used the dilemma is an extremely effective form of argument. Its effectiveness, however, like that of the disjunctive syllogism, depends upon the exhaustiveness with which the alternatives are stated. In many, perhaps most, dilemmas some of the alternatives are overlooked; so that the argument can be blocked by simply pointing out this fact. "Thus if we were to argue that 'if a pupil is fond of learning he needs no stimulus, and that if he dislikes learning no stimulus will be of any avail, but that, as he is either fond of learning or dislikes it, a stimulus is either useless or of no avail,' we evidently assume improperly the disjunctive minor premise. Fondness and dislike are not the only two possible alternatives, for there may be some who are neither fond of learning nor dislike it, and to these a stimulus in the shape of rewards may be desirable." *

* Jevons, *Lessons in Logic*, p. 168.

The Relation of Categorical and Conditional Syllogisms.—A comparison of the categorical syllogism with conditional syllogisms shows that the two differ widely in their emphasis or mode of procedure. The categorical syllogism, as traditionally interpreted, concerns itself altogether with the relations of inclusion and exclusion of classes, i.e., with the aspect of denotation or extension. This works very well as a rule, although the interpretation in terms of classes becomes rather artificial in some instances. For example, it is undeniably stilted to interpret, 'Pride goeth before a fall,' as meaning, 'The class of things characterized by pride falls within the class of things that go before a fall.' It is stilted for the reason that when the statement is made, we are not thinking of the relations of classes at all. Our attention is occupied with the connotative or intensive side of the proposition; or, to put it differently, with the relations of the abstract attributes or characters 'pride' and 'fall.' Extension and intension are both genuine aspects of propositions, but they do not necessarily receive the same emphasis in our thinking. Conditional syllogisms differ from the categorical in that they emphasize this intensive character. Conditional propositions aim to set forth universal principles or abstract relations of conditioning, with no special reference to the objects in which those principles are embodied.

This difference, however, is after all only a difference in emphasis or in point of view. The form of a proposition, therefore, is usually determined by what happens to be uppermost in our minds. 'All men are mortal,' tends to emphasize the extensive side:

in 'Man is mortal,' the connotative side comes forward; which is perhaps still more apparent if we say, 'If a being is a man, he is mortal.'

Since the difference between categorical and conditional syllogisms does not concern their meaning, it is easy to change a syllogism from one form to another. For the same reason it is clear that an argument which is invalid in any one of these forms cannot be made valid merely by being changed to a different form. The hypothetical syllogism—

If a person is kind-hearted he will speak well of others;
This person is not kind-hearted;
Therefore he will not speak well of others—

is invalid, because the minor premise denies the antecedent. If we change it to the categorical form, we have:

All persons who are kind-hearted speak well of others;
This person is not kind-hearted;
Therefore this person does not speak well of others.

In this form the syllogism is invalid, because it commits the fallacy of illicit major. If in the hypothetical syllogism we should substitute for the minor premise a premise that affirms the consequent, 'This person speaks well of others,' and should then change the syllogism to the categorical form, the argument would read:

All persons who are kind-hearted speak well of others;
This person speaks well of others;
Therefore this person is kind-hearted.

In this form the fallacy is still present, but it now appears as an undistributed middle.

Disjunctive propositions change their forms as readily as hypotheticals. 'A is either B or C,' is equivalent to the hypothetical proposition, 'If A is B it is not C,' or to the categorical proposition, 'The situation in which A is B is a situation in which A is not C.' The assertion that a Congressman is either a Senator or a Representative means that if a Congressman is a Senator he is not a Representative, or that no Congressmen who are Senators are Representatives.

The Function of the Syllogism.—At the beginning of our study of the syllogism it was stated that the syllogism makes certain assumptions, i.e., it confines itself to a certain part of reasoning and does not pretend to include the whole. In order to see clearly the function of syllogistic reasoning, it is necessary to keep this limitation in view. The categorical syllogism, for example, takes no heed of the manner in which classifications are made and tested, but devotes itself entirely to the relations of the classes after they have been formed. This simplifies the situation immensely, since it puts aside one of the most difficult tasks of reasoning. Similarly, the hypothetical syllogism does not take up its work until the relations of conditioning and conditioned, with which it operates, have already been discovered. It assumes the existence of this relation, just as the categorical syllogism assumes the existence of classes; and so it likewise escapes the burden and the heat of the day.

Essentially the same remarks apply to the dis-

junctive syllogism. Given the relations of disjunction, then the affirmation of one of the alternatives, as the disjunctive syllogism informs us, involves the denial of the rest; and conversely, the denial of all the other alternatives is equivalent to the affirmation of the one that remains. But how the disjunctive relations are to be discovered and tested, we are not told. To make sure that our alternatives are both true and exhaustive in their presentation of the situation is ordinarily the task that requires the greatest effort and involves the greatest risk of error; but it is a task that falls outside the proper sphere of the syllogism itself.

One of the main functions of the syllogism comes into view when we examine the nature of the fallacies that result from the transgression of the syllogistic rules. The fallacies that may occur in connection with the categorical syllogism group themselves under four heads: (a) The fallacy of four terms, (b) The fallacy of undistributed middle, (c) The fallacies of illicit major and illicit minor, (d) The fallacy of negative premises. The hypothetical syllogism recognizes only the fallacies of denying the antecedent and affirming the consequent. With regard to the disjunctive syllogism, the only fallacy that can well occur is that of imperfect, or false, disjunction. Of these fallacies all but the first and the last can be explained as due to errors in the quality or quantity of propositions, as was pointed out in each separate instance that arose. For the two outstanding forms of fallacy the syllogism furnishes no remedy. The form in which the fallacy of four terms is most likely to impose upon us is that of ambiguity, when the middle term is identical in ap-

pearance but different in meaning in the two premises. This happens, for example, when we argue that if law implies a lawgiver, nature must have a lawgiver, since it has laws. But the study of the syllogism does not aid us in the detection of this kind of ambiguity. Nor does it assist in the discovery of imperfect disjunctions. But it does give us some help in connection with the special forms of ambiguity known as obversion and conversion. In other words, it forces us constantly to test the meaning of our propositions and thus tends to make us sensitive to those differences of meaning which are slurred over in false obversion and conversion.

One function, then, of the syllogism is the interpretation of language, so far as it concerns obversion and conversion. A second function, the utility of which has not yet appeared, is to acquaint us with the structure of complete arguments. The arguments of everyday life are usually more or less incomplete. We frequently take premises for granted, with no clear consciousness that we are doing so; with the result that we are constantly exposed to the danger of false assumption. In so far as the syllogism fosters the habit of looking for those parts of the argument which are suppressed, it furnishes a protection against this fallacy. The nature of false assumption and its relation to the syllogism form the topic of the next chapter.

CHAPTER VIII

FALSE ASSUMPTION, OR BEGGING THE QUESTION

Incomplete Arguments.— In our study of the syllogism we have taken account only of complete arguments, because the syllogism aims only to set forth the structure embedded in inference, and not to examine the conscious processes by which the conclusions are reached. If we compare the completed syllogism with the more usual reasoning processes, as they actually occur in our minds or as they are expressed in words, we find that the latter are much less complete than the former. The syllogism has two premises and a conclusion, all duly arranged and set in order. In our ordinary inferences, on the other hand, some part of the complete argument is apt to be lacking. Such arguments are known in logic as *enthymemes*, because, as the name implies, some part of the argument is not expressed, but is supposed to be ‘in the mind.’ “ There are three kinds of enthymeme:

“ 1. With the major premise omitted.

“ This enterprise will tend to increase the public wealth, because it will promote the general happiness of the people. L

“ 2. With the minor premise omitted.

“ That expedition is doomed to failure, because no small

body of men insufficiently equipped and cut off from their base of supplies can ever reduce so strongly fortified a garrison.

“3. With conclusion omitted.

“All members of that conference were traitors to their party. And you were a member of that conference. Nothing more need be said.” *

The reason why we deal with incomplete arguments seems to be twofold. A part may be omitted, either because the assumption is so obvious that explicit statement would be unnecessary, not to say pedantic; or because the assumption is so well concealed that we are quite unaware of its presence. In the latter case it is evidently rather far-fetched to say that the missing part of the argument is carried along in the mind. Nevertheless, the argument implies this missing part, in the sense that unless it is true the reasoning as a whole is not true. Thus a person may argue for the compulsory arbitration of labor troubles, on the ground that this would be much more economical; and he may be unconscious all the while that he is taking for granted one of the premises of the argument. If put into the form of a syllogism the argument would run about as follows:

Whatever is economical may be enacted into law;

Compulsory arbitration would be economical;

Therefore compulsory arbitration may be enacted into law.

* Hibben, *Logic, Deductive and Inductive*, p. 131.

The major premise may receive no mention at all, yet unless its truth is conceded, the argument falls to the ground.

The Definition of False Assumption.—The assumption that is made unconsciously is naturally much more dangerous than the kind that is made with explicit awareness of the fact. As the above illustration shows, it may be found that the premise which is thus tacitly assumed is anything but self-evidently true. False assumption, or begging the question, then, consists in *making an assumption which an opponent would not grant if its real character were understood.*

False Assumption, Ambiguity, and Imperfect Disjunction.—The definition of false assumption given in the preceding paragraph may be taken in a wider or in a narrower sense. Taken in the wider sense, false assumption includes both ambiguity and imperfect disjunction. In the narrower sense, it refers only to arguments in which the questionable premise is not put into words, but is quietly taken for granted. In common usage the term is not confined to arguments in which one of the premises is suppressed, and so we shall first discuss false assumption in relation to ambiguity and imperfect disjunction. It will appear that the fallacies of ambiguity and imperfect disjunction may also, if we see fit, be viewed as cases of false assumption.

If the questionable proposition which serves as a premise contains an ambiguity, the false assumption is to be found in the fact that a certain meaning is given to this proposition, without proof that this meaning is the one which should be assigned to it. Thus, if we should argue that a proposed measure (e.g., pro-

hibition) is wrong, because it is an infringement upon personal liberty, and all infringements upon personal liberty are wrong, it may be open to an opponent either to point out that 'personal liberty' is an ambiguous term, having a wider and a narrower meaning, or he may accuse us of begging the question, because we assume without proof that the meaning of the term is such as to make it applicable to the proposed measure. By what name the fallacy shall be called depends upon the point of view that happens to be taken, i.e., upon the phase or aspect which receives chief notice.

In case the debatable proposition contains a false disjunction, it may be said to beg the question, because the disjunction is offered without proof that it is correct. As examples we may take two arguments which were advanced in order to prove the common belief that every event has a cause:

1. Whatever is produced without a cause is produced by nothing, or in other words has nothing for its cause. But nothing can never be a cause. Hence every object has a real cause of its existence.

2. Everything must have a cause; for if anything wanted a cause it would produce itself, that is, exist before it existed, which is impossible.*

The question here raised is in both instances whether anything can come into being without a cause; whether a thing has to be 'produced' in order to exist. Both arguments, however, assume this very

* Cf. Hume, *Treatise of Human Nature*, Part III., Section 3.

point by means of an imperfect disjunction. They present various alternative ways in which things might be supposed to come into being, but these alternatives all presuppose some kind of agency. The first argument says that the agency is either a 'real cause' or a hypostatized abstraction called 'Nothing.' The second argument bids us decide whether a given thing was produced by something else or by itself. In each case the disjunction evidently leaves out the one alternative that is under discussion, viz., whether things need any cause at all for their existence. In other words, the disjunction presupposes an agency of some sort for every event, and thus begs the question.

False Assumption and the Syllogism.—It was pointed out before that the study of the syllogism affords no protection against ambiguity, other than false obversion and conversion, nor against imperfect disjunction. The syllogism may, however, be of service in connection with false assumption in the narrower sense, viz., the false assumption which involves the suppression of a premise. 'This kind of fallacy is due largely to the fact that we have not acquired sufficiently the habit of noticing the implications of our reasoning. The reasoning, as it stands, is incomplete, and if we were properly critical, we should endeavor to complete it. But this ordinarily requires practice; and this practice is furnished, in a way, by the syllogism, since it accustoms us to the requirements of a complete argument. To argue, for example, that democracy is an undesirable form of government, because it has certain specified defects, is to assume, as the syllogism helps us to see, that

governments with such defects are undesirable; which, as a universal proposition, may well be open to doubt. In short, the study of the syllogism tends toward the discovery of hidden assumptions, and thus it makes for the elimination of assumptions that are indefensible.

To criticize our own arguments and to unearth their hidden assumptions seems to be particularly difficult if the matter at issue is something that concerns our practical interests. We are prone, in such circumstances, to insist exclusively upon our side of the case. The reason why we do not get our opponent's point of view may be that we do not look for our own assumptions and reflect upon them impartially. The following passage from a daily newspaper exemplifies this tendency:

“ The cause of the first strike [Chicago Stock Yards, 1903] was wages. More particularly it was the wages of unskilled laborers. Under the agreement of last year the packers had been paying $18\frac{1}{2}$ cents an hour. Meanwhile the conditions of the labor market had changed. Hundreds of men were presenting themselves every morning to request the opportunity of working for 16 or even 15 cents an hour. The packers felt that it was unfair to require them to pay more than the law of supply and demand indicated.

“ The argument offered by the union ignored the law of supply and demand. It based itself on living conditions. The average number of working hours provided for unskilled laborers during an average week was said to be about forty. Forty hours at $18\frac{1}{2}$ cents an hour makes \$7.40. No man, said the union, could live decently on less than \$7.40. And the

packers could pay \$7.40 without seriously reducing their dividends."

It is evident that each side is making an assumption. We may attempt to state both arguments in syllogistic form, so as to bring to light the assumptions:

1. Wages as determined by supply and demand are proper wages;

Sixteen or fifteen cents per hour are wages as determined by supply and demand;

Therefore sixteen or fifteen cents per hour are proper wages.

2. Wages as determined by living conditions are proper wages;

Not less than eighteen and a half cents per hour are wages as determined by living conditions;

Therefore not less than eighteen and a half cents per hour are proper wages.

Neither side seems to criticize its own assumptions, yet one at least must be wrong. It would probably be pretty generally conceded that both supply and demand and living conditions should be considered. If this is true, then the question of what constitutes proper wages is begged by the assumption that the matter is determined by either of these considerations to the exclusion of the other.

As a second illustration of questionable assumption we may consider this argument, which is intended to show that the accounts of miracles are presumably untrustworthy:

"We must admit that all probabilities must be against miracles, for the reason that that which is probable cannot by any possibility be a miracle.

Neither the probable nor the possible, so far as man is concerned, can be miraculous. 'The probability therefore says that the writers and witnesses were either mistaken or dishonest.' *

That 'neither the probable nor the possible can be miraculous' is perfectly true, if we determine probability and possibility by conformity to natural law, as the writer plainly does. If we confine ourselves to natural law we must concede that it is neither probable nor possible that the dead should come to life or that water should be turned into wine. But if we proceed to say that miracles are therefore improbable, we evidently base our assertion upon the incompatibility of miracle with natural law. Is this incompatibility a fair test of improbability? Since the question at issue is whether events that are incompatible with natural law have ever occurred, the assumption that such events are improbable clearly begs the question. The fallacy involved may also be classified as an ambiguity. The term probability may be taken to refer either to 'ground for belief' or to 'ground for belief on the basis of natural law.'

Two Special Forms of False Assumption.—A. Reasoning in a Circle.—The fallacy of false assumption, like ambiguity, presents some easily recognizable forms, which are of sufficient interest to entitle them to special mention. One of these is *Reasoning in a Circle*. It consists in using a proposition as a premise to prove a conclusion, and then at some other stage in the argument proving this premise by means of the very conclusion which it has previously helped to establish. In other words, the conclusion

* *North American Review*, Vol. 150, p. 332.

presupposes the premise and the premise presupposes the conclusion. In this way the thing that is to be proved is presupposed, for we must be sure of the conclusion before we have a right to use the premise.

To cite examples of this fallacy is usually difficult, for the reason that the fallacy is not likely to occur except in the course of a lengthy argument. When the argument is brief, we are more apt to see all the different parts at once and to notice this peculiar relation of the two propositions that help to prove each other. The following, however, will serve as an illustration:

“ It is wrong to take the life of a fellow man, for God has distinctly commanded us not to, and it is wicked to disobey his commandments. If any one pretends to doubt that this commandment really did come from God, I can only appeal to his own conscience and his own common sense. When God gave the Commandments to his people is it likely that he would have omitted the most important of them all—a commandment which only expresses the natural feeling of every normal human being? ” (Aikins, *Logic*, p. 469.)

If we state this argument in two syllogisms its circular character will be evident:

I. Whatever is forbidden by God is wrong;
To take the life of a fellow man is forbidden by God;
Therefore to take the life of a fellow man is wrong.

II. Whatever is wrong is forbidden by God;
To take the life of a fellow man is wrong;
Therefore to take the life of a fellow man is forbidden by God.

The proposition, 'To take the life of a fellow man is wrong,' functions both as a conclusion and as a premise. We know that taking life is wrong because it is forbidden by God, and we know that it is forbidden by God because we know (through conscience and common sense) that it is wrong. Similar remarks apply to the proposition, 'To take the life of a fellow man is forbidden by God.'

B. Irrelevancy, or Ignoring the Question.—A second form of false assumption consists in proving something quite other than the point at issue. Thus "instead of proving that 'this prisoner has committed an atrocious fraud,' you prove that the fraud he is accused of is atrocious: instead of proving (as in the well-known tale of Cyrus and the two coats) that the taller boy had a right to force the other boy to exchange coats with him, you prove that the exchange would have been advantageous to both: instead of proving that the poor ought to be relieved in this way rather than in that, you prove that the poor ought to be relieved." (Whately.)

It may seem a little strange that entirely different questions should be mistaken for each other. This is less strange, however, when we notice how the mistake comes about. The argument that the exchange of coats was advantageous to both boys, which is offered as a justification for the taller boy's procedure in compelling an exchange, is a good example. The conclusion that the exchange was for the good of both parties is relevant, if we treat it as a premise for a second conclusion. Add to this premise the further premise—which is not stated but assumed—that, 'All exchanges which are for the good of both

parties are right,' and we are enabled to draw the required conclusion: 'This exchange was right.'

It appears, then, that the conclusion, 'The exchange was advantageous,' which the argument actually proves or aims to prove, is irrelevant only in the sense that it is incomplete. What is proved is not the point at issue, but a proposition which, *together with a tacit assumption*, is equivalent to the proof of the point at issue. But if the assumption is of a questionable character, it requires justification, and until this is furnished, the argument is irrelevant and goes for naught.

The person who commits the fallacy of irrelevancy is, of course, quite unaware of his error, unless his purpose be to mislead. He does not see that the proposition which he proves is related to the point at issue only through a questionable assumption. But in criticizing an irrelevant argument it is not necessary to point out the nature of the assumption which underlies the argument. Merely to show that what is proved is not what ought to be proved or what is supposed to be proved, answers the purpose of criticism. 'True, but irrelevant,' is often the most concise and effective criticism. "Thus when in a discussion one party vindicates, on the ground of general expediency, a particular instance of resistance to government in a case of intolerable oppression, the opponent may gravely maintain 'that we ought not to do evil that good may come'—a proposition which, of course, had never been denied, the point in dispute being 'whether resistance in this particular case *were* doing evil or not.' Or again, by way of disproving the assertion of the right of private judgment in

religion, one may hear a grave argument to prove that 'it is impossible every one can be *right in his judgment.*'" (Whately.) The first of these arguments assumes, as a second premise, that 'this is a case of doing evil that good may come'; while the second takes for granted that 'if every one cannot be right in his judgment, then private judgment should not be permitted.' These assumptions, however, are highly questionable, and until they are proved the arguments are beside the question.

In a similar way an argument to prove that the compulsory arbitration of labor disputes would be economical might be set aside as irrelevant, if the question were, not whether arbitration would be more economical, but whether this form of economy should be brought about by legislative enactment. Again we might treat as irrelevant the proof that the law of supply and demand requires a certain scale of wages, or that living conditions determine a certain minimum for wages; if it is once admitted that the question is by what standards the proper scale of wages is to be determined in a specific case.

A further illustration of irrelevancy may be drawn from Dr. Samuel Johnson's "Taxation no Tyranny," in which the writer attempts to show that the American Colonies had no right to rebel against the system of taxation imposed upon them by the British government:

"A tax is a payment exacted by authority from part of the community for the benefit of the whole. From whom, and in what proportion, such payment shall be required, and to what uses it shall be applied, those only are to judge to whom government is in-

trusted. In the British dominions taxes are apportioned, levied, and appropriated by the states assembled in parliament.

“ Of every empire all the subordinate communities are liable to taxation, because they all share the benefits of the government, and therefore ought all to furnish their proportion of the expense.

“ This the Americans have never openly denied. That it is their duty to pay the costs of their own safety they seem to admit; nor do they refuse their contribution to the exigencies, whatever they may be, of the British empire; but they make this participation of the public burden a duty of very uncertain extent, and imperfect obligation, a duty temporary, occasional, and elective, of which they reserve to themselves the right of settling the degree, the time, and the duration, of judging when it may be required, and when it has been performed.”

The question here argued is that taxes may be levied and apportioned by those ‘ to whom government is intrusted.’ Since the question raised by the colonies was not whether the government could impose taxes, but whether the colonies rightfully constituted a part of the government (i.e., had a right to representation), the argument is irrelevant to the point at issue.

A subordinate form of this fallacy is known in logic as the *Argumentum ad Hominem* or the *Argumentum ad Populum*, according as it is directed to an individual or to a multitude. This fallacy is incurred whenever an appeal is made to emotion or passion or prejudice, to the neglect of the point at issue. While appeals to emotion doubtless have a legitimate and necessary function, they are to be condemned

when they are offered as substitutes for argument and when by confusing issues they obscure the conditions of the situation. In the plea for the abolition of capital punishment about to be quoted, the writer ignores the main issue, viz., the good of society, and strives to arouse religious sentiment by the presentation of a consideration which is essentially irrelevant to the situation. The plea asserts that one consideration "would be alone a sufficient reason for rejecting the extreme penalty: we mean the necessity that there is for an admixture of the element of mercy in all human punishments. Be a man as guilty as he may, he is still 'bound with the cords of a man' to all mankind: he is still our brother, and has a right, if no longer to our affection, at least to our pity. Nay, if not for *his* sake, at least for *our own*, we are bound to show him mercy. How shall we hope for mercy, rendering none? We know full well that 'with what measure we mete, it shall be measured unto us again,' and that 'our Heavenly Father will not forgive us, unless we from our heart forgive every one his brother their trespasses.' If we say to a fellow criminal (perhaps, if all could be known, not so intrinsically wicked as ourselves), that he shall have no mercy upon earth, how can we hope for mercy before the judgment seat of God? This is a solemn consideration, but it is one on which we can rest our case, for it appeals to the very heart of Christianity, and can only be answered in one way." *

* *Eclectic Review*, July, 1849, p. 118.

CHAPTER IX

THE PROOF OF UNIVERSAL CONNECTIONS

The study of the syllogism has shown us what the relation of classes must be in order that valid conclusions may be drawn. It assumes, however, that the classes with which it deals are marked off with sufficient clearness to warrant assertions that are applicable to all the members of the class. Until this condition is fulfilled there is no room for syllogistic reasoning. But we have also seen that the existence of class names does not signify that we know their precise import; for if we did there would be no ambiguity. Class names may cover a variety of things, so that a statement which is true of some is not necessarily true of all. We must now take up the question in what way universal propositions may be tested, so as to make them available for purposes of syllogistic inference.

The question at issue may be stated in either of two ways: (a) How may we assure ourselves that all members of the class A possess the attribute B; or, (b) How can we ascertain whether the attribute A is an unfailing sign of the attribute B. The difference in the questions is the difference between extension and intension. We may ask ourselves, for example, either how we happen to know that all men

are mortal beings, or how we know that the attribute 'man' is always conjoined with the attribute 'mortal.'

To say that we know this from experience is unsatisfactory, because experience is too vague a term. There are different experiences, and we wish to know what kind of experience it is that furnishes this information. No one would claim that he knows this fact regarding man from the personal observation of all cases. Nor is the experience in question the kind of experience which we mean when we say that we have experienced a toothache or that we know from experience the advantages of early rising.

Proof by Enumeration.—A more definite answer is offered when it is said that we know this proposition to be true through Simple Enumeration (*Inductio per enumerationem simplicem*). By this term is meant that the conjunction of 'man' and 'mortality' has been observed in a number of instances; or, to be more direct, that a certain number of persons have been known to die. Moreover, there are no known exceptions to the rule. And whenever a rule is verified again and again in this way, without ever being violated, a point is finally reached when we may cease to enumerate individual instances and say that what is true of some is true of all.

That something of this sort occurs in connection with propositions like, 'all men are mortal,' 'all water is H_2O ,' 'all life is from the living,' and 'all unsupported terrestrial bodies fall,' seems to be beyond dispute. If, therefore, we are to find fault with this explanation it must be because it does not bring out the essential point that is involved in the proof of

universal connections. The incompleteness of the explanation appears when we attempt to state why ten cases constitute a stronger proof than one. It is evident that, in so far as the cases are all alike, one is as good as a greater number. Numbers, therefore, can be of importance only in so far as the several instances are in some respects different from each other. But what part the differences play is left unexplained.

It may also be pointed out that the degree of proof does not vary in direct proportion to the number of instances observed. Sometimes an enumeration may proceed a long time without bringing to light any exceptions and yet be found untrue in the end. "To an inhabitant of Central Africa fifty years ago, no fact probably appeared to rest on more uniform experience than this, that all human beings are black. To Europeans not many years ago, the proposition, 'All swans are white,' appeared an equally unequivocal instance of uniformity in the course of nature. Further experience has proved to both that they were mistaken; but they had to wait fifty centuries for this experience. During that long time, mankind believed in an uniformity of the course of nature where no such uniformity really existed."* On the other hand, a proposition like, 'all water is H_2O ' may be established by relatively few instances. If numbers alone were decisive, this proposition would be much more uncertain than the propositions that swans are white and that men are black.

Proof by the Method of Agreement.—While numbers doubtless contribute something towards cer-

* Mill, *System of Logic*, Book III., Chapter III., § 2.

tainty, the reason why they do so is that the different instances are all different from each other. Thus men differ in nationality, in color, in occupation, in tastes, in talents, and in a thousand other matters besides. But all are mortal; and so we conclude that these differences have nothing to do with mortality. In other words, while it is true that numbers, merely as numbers, do not prove anything, yet in fact the gathering of instances does tend towards proof, because it sifts out the essential from the accidental. Wherever we find the attribute 'man' we have the attribute 'mortal,' however much the other attributes may vary. By viewing 'man' in diverse contexts or circumstances, we find that these may be ignored. If, therefore, we wish to prove a universal connection, we must select our cases so as to vary the circumstances as much as possible. The process is a process of elimination. We rid ourselves of those circumstances in which our cases differ, in order to isolate the circumstance in which they all agree. If we find that all the circumstances can be varied, except one, we are entitled to conclude that this circumstance in which all the cases agree is an unfailing sign of the attribute in question; and the method by which this conclusion is established may, therefore, be called the Method of Agreement.

In the application of this method, the number of cases necessary for proof depends upon the extent to which they are different from one another. The method requires a sufficient number to vary all the irrelevant circumstances, whether that number be great or small. The following is a statement of the method: *If two or more instances of the phenomenon*

*under investigation have only one circumstance in common, the circumstance in which alone all the instances agree is an unfailing sign or correlate of the given phenomenon.**

The conclusion, then, to which we are led is that enumeration as such is not a form or method of proof. The mere accumulation of instances does not contribute to the support of an inference. Enumeration is in itself merely a tool in the hands of the method which seeks to prove a universal by varying all the circumstances that do not constitute a part of the universal connection. This function of enumeration, however, has at times been misconceived. Thus Jevons says that "An Induction, that is an act of inductive reasoning—[reasoning from particular instances to a universal]—is called perfect, when all the possible cases or instances to which the conclusion can refer, have been examined and enumerated in the premises."† That all the apostles were Jews, that all the months in the year contain less than thirty-two days, and that all the known planets revolve about the sun, would, from this standpoint, be considered perfect inductions, because all the cases in question have been duly examined and enumerated. On the

* This method, as formulated by Mill (*cf. System of Logic*, Bk. III., Ch. VIII., § 1), was intended by him as an instrument for the testing of causal connections. As here used its function is to prove universal connections, i.e., connections in which A is an invariable sign of B. For this reason, the statement of the method, as just given, varies slightly from Mill's formulation. The study of causal connections, (unless we mean 'total' and not 'partial' cause), is a different matter from that of universal connections, and so it falls more properly under a different method, as will be shown in the succeeding chapter.

† *Lessons in Logic*, p. 212.

other hand, propositions like 'All men are mortal,' and 'All water is H_2O ,' are called by the same writer imperfect inductions, because there is no certainty that future cases will be like those already known. It may be argued, however, that this 'perfect induction' is not inference at all, but merely a summation of instances. Since we are concerned, not with the summation of instances, but with an underlying law, we must resort to analysis. The proof for the law must be furnished by the method which varies all the irrelevant details, i.e., by the Method of Agreement.

The Principle of Uniformity.—The principle that underlies this method may be stated as follows: *Any relation is universal if all the circumstances accompanying the related facts may be varied without a change in the relation itself.* The term relation is here used in a very wide sense. A relation "exists between two facts whenever the mind can at once distinguish the facts as two, and at the same time attend to them together and assert something of them considered together."* Thus the proposition 'all men are mortal' distinguishes between 'man' and 'mortal' and asserts the relation of coexistence between them. This principle is frequently called the uniformity of nature. It means that nature behaves the same way under the same conditions; or that the unobserved is the same in kind as the observed. On the basis of this principle we are enabled to make assertions about facts that have never come within the range of our direct experience.

Uniformity as a Postulate.—The question has been debated how it happens that we make the assump-

* Hobhouse, *Theory of Knowledge*, p. 271.

tion that nature is uniform. The term postulate signifies that the uniformity of nature is a presupposition of reasoning, in the sense that its truth is necessarily taken for granted, whether consciously or unconsciously, before reasoning can begin at all. We reason as though the principle were true, simply because we are built that way. It has been held, however, that uniformity is itself an inference and not a presupposition. We first observe, it is said, that in a given number of instances A and B are related in a certain way, and this leads us to infer that they will be related in the same way in the future. When a number of particular uniformities have been thus obtained, we take a further step and infer that all nature is uniform. This inference is conceded to be merely probable, since we cannot prove that no exceptions will ever occur; but whether certain or merely probable, the principle must be suggested by experience, and is not a presupposition that is present from the start.*

This argument gains plausibility from the fact that it assumes what it attempts to prove. A and B have always happened together in the past, it is said; therefore they will happen together in the future. But that A and B will be related in the future as they have been related in the past, can be inferred only if we take for granted that the future will be like the past, i.e., if we postulate the uniformity of nature. Until this assumption is made, no amount of experience can furnish a basis for the expectation of future events. This appears if we state the argument in the form of a syllogism:

* Cf. Mill, *System of Logic*, Book III., Chapters III. and XXI.

Things that have always happened together in the past will happen together in the future;

A and B are things that have always happened together in the past;

Therefore A and B are things that will happen together in the future.

It is evident that the major premise is merely a rough statement of the law of uniformity. We may therefore conclude that the uniformity of nature is an assumption which does not wait upon experience, but which is present from the start, and which can be justified only by its results.*

The tendency to universalize the relations that come under our notice is a part of our mental make-up. We do not learn to universalize; but what we learn is to universalize more cautiously. Our natural disposition is to ignore the concomitant details. Popular superstitions are a flagrant example. The belief that Friday is an unlucky day, that dreaming of a fire foreshadows a death in the family, etc., may have its basis in nothing further than a coincidence. The two facts have been observed together and the relation is promptly universalized. Even if there is a genuine

*That the principle of uniformity appears as our major premise whenever we throw our reasoning into the form of a syllogism, Mill himself affirms. His belief that particular uniformities come first and that these form the basis for our belief in the general principle of uniformity is apparently determined by the fact that we first become acquainted with particular uniformities and that these then enable us to formulate the general principle of uniformity. This is doubtless true, but is altogether irrelevant. The order in which things emerge into consciousness is one thing, the implication of inference is quite another. The general principle of uniformity is implied in the sense that, unless its truth is granted, the inference to a particular uniformity is fallacious.

connection, this disregard of concomitants may appear. Hence it is found necessary to qualify many early generalizations. Sparks will explode powder—except when the powder is damp; dogs are amiable—except when eating; strangers are truthful—except when they have an end to attain; horses are docile—except when frightened, etc. These qualifications express a tardy recognition of accompanying circumstances that were previously neglected; or, to state the same thing differently, they indicate a realization that the facts between which the relation obtains are more complex than was first supposed.

The Impossibility of Varying all Irrelevant Circumstances.—It has already been shown that the number of instances is less important for the proof of a universal than the character of the instances as representative of their various kinds. If all the kinds within the class are represented, the inference from some to all is justified, whether the number of representative instances be few or many. The inference that all men are black might be based on extensive observation; but it is wrong, because all kinds are not included in the observation. Before we can reason from some to all, we must have grounds for thinking that if any other kinds existed we should know about them.

It must be recognized, however, that this form of proof implies an ideal to which it is impossible to attain in practice. The instances from which we reason must be representative (i.e., every 'kind' within the class must be represented), because we wish to vary all the circumstances except one. But we never know exhaustively what all the circum-

stances of a given case may be. If all the circumstances of any fact were completely known, we should be omniscient, because every fact in the universe forms a part of the environment of every other fact. If, therefore, we were to try seriously to vary all the circumstances but one, as the Method of Agreement demands, our enumeration would have to include every case in existence, and even then it would fall short of the ideal. Every case is in some respects different from every other, and so might be considered as in some respect a new 'kind.' We cannot eliminate all differences without considering all instances, and to consider them all is impossible. How, then, can we ever justify the inference from some to all? It seems plain that our method, as here formulated, makes an impossible demand.

For a concrete illustration of this difficulty we may turn again to the proposition, 'all men are mortal.' We do not know in detail the conditions that determine mortality. We have found, to be sure, that men are mortal, irrespective of nationality, race, and similar conditions. But it is impossible to show that no combination of circumstances, such as diet, occupation, and hygienic conditions in general can ever occur that will enable a man to live forever. It might, therefore, be argued that we cannot infer mortality in any given case, until we have made sure that this unique combination of circumstances is not realized in this particular case. If we once grant that every individual is unique, i.e., is a new 'kind,' the possibility presents itself that this uniqueness may in any particular instance be the very condition which is necessary for perpetual existence.

Reasonable Doubt.— The difficulty here involved is met, both in practical life and in theoretical matters, by reference to what is known in debate as the burden of proof. It is possible in any situation that something important has been overlooked. If this possibility were a sufficient ground for doubt, then we could never make any inferences. But while this possibility is not denied, we ask in turn what reason there is to suppose that there are any exceptions to the rule. Unless there is a specific reason to the contrary, we *assume* all the circumstances accompanying A and B to be irrelevant. Other men have died; is there any ground for thinking that this man is different in any essential respect? If no such ground can be indicated, i.e., if there are no accompanying circumstances which would naturally make us suppose that the present case is an exception, the doubt whether the rule applies is gratuitous. The doubt is then without a basis or motive. The nature of an unreasonable or unmotivated doubt will appear more fully as we proceed, but as a provisional definition we may say that it is a doubt which is unable to point to an essential fact as its basis.* Of this character would be the doubt whether this particular man is mortal. The person who doubts the rule is required to show why he thinks that any given case constitutes an exception. If no reasons are forthcoming, the doubt is set aside, because unmotivated doubt serves no other purpose than to paralyze thought and action. If such doubt is to be considered, no rule can be depended upon, i.e., any particular case may be an

* A more complete definition of reasonable doubt is given in Chapter XI, p. 166.

exception. Before we give up all chance to know and to act, we must have something better than an unmotivated doubt.

We may sum up, then, by saying that to establish a universal proposition it is of value to have many cases, because the cases serve to vary the circumstances. Ideally all the circumstances that are accidental should be varied, in order to show that the remaining ones are universally related. But since this is impossible in practice, the circumstances are varied as much as possible, and then appeal is made to the principle that all doubt must be motivated. If we can 'see no reason to believe' that any given case constitutes an exception, the rule is provisionally accepted as of universal validity. We do not vary *all* irrelevant circumstances, but only those concerning which there is room for motivated doubt.

Conversion.—An apparent difficulty remains to be considered. The principle of uniformity says that any relation is universal if there are no accompanying circumstances which make a difference. If, therefore, the relation A—B is found to be universal, A must be an invariable sign of B, and B must be an invariable sign of A. A relation is not universal, unless the two facts concerned always go together. But this seems to conflict with the facts. It is true, of course, that from 'man' we can infer 'mortal,' but it is by no means equally true that from 'mortal' we can infer 'man.' The inference from A to B may be warranted universally, but not the inference from B to A. As was shown previously, universal affirmative propositions are not amenable to simple conversion.

The reason for this apparent discrepancy between

the principle of uniformity and the actual relation between the subject term and the predicate term of our universal propositions is that in practice we frequently fail to analyze our predicate term far enough to make the relation of A and B reversible. For example, a person who is drowned is dead, but we cannot infer that one who is dead must have met death by drowning. And yet it is just as safe to infer from 'dead' to 'drowned,' if we happen to know the peculiar effects that are produced by drowning. In other words, drowning not only produces death but a peculiar kind of death; and if this peculiar nature is duly considered, the relation is strictly reversible. Similarly, the attribute mortality is in strictness different in the case of men and the lower animals.

We merely state the same thing in different language if we say that we vary the circumstances in order to determine that 'man' always signifies 'mortal,' but we do not similarly vary the circumstances in order to ascertain whether a particular kind of mortality always signifies 'man.' The latter does not happen to be a matter of interest to us at the time. We simply note the general attribute 'mortal'; we do not stop to determine more precisely what peculiar kind of mortality it is that is universally related to man, independently of accompanying circumstances.

Mathematical Propositions.—Before we leave this subject, some consideration should be given to mathematical propositions, which seem to constitute an exception to our conclusions regarding universal connections. That $1+1=2$, for example, is undisputed,

nor do we concede the possibility of exceptions. Universals of this kind seem to differ from others, both in degree of certainty and in their independence of concrete experience. These universals represent to us ideal certainty, and, moreover, they seem to be established by a method other than that of varying all the irrelevant circumstances.

A closer comparison, however, of these with other universals enables us to discover a family resemblance. It is true that mathematical universals ordinarily possess greater certainty and that the Method of Agreement is less in evidence; but the difference, after all, between them and other universals is merely a difference in subject-matter, not a difference in the form of proof. In the first place, the universals of mathematics are, like all other universals, dependent upon experience. In order to know that one unit added to another unit gives a whole of two units, we must have some experience with the world of fact. Units are merely abstractions, and before they can be obtained, we must have things from which to abstract. These things may be anything we please, from a concrete object such as a tree, to an aggregate like a mob, or something intangible like a philosophical system or a moral aspiration. Whatever the things in question may be, they possess from one point of view the character of unity and may be treated as units. This character of unity is isolated by abstraction. After our units are once obtained, they maintain their identity and integrity through our determination that each unit shall be a unit, a whole unit, and nothing but a unit, as long as our calculation is in progress. "How could our notion that one and

one are eternally and necessarily two ever maintain itself in a world where every time we add one drop of water to another we get not two but one again? in a world where every time we add a drop to a crumb of quicklime we get a dozen or more?—had it no better warrant than such experience? At most we could then say that one and one are *usually* two. Our arithmetical propositions would never have the confident tone which they now possess. That confident tone is due to the fact that they deal with abstract and ideal numbers exclusively.”*

It is evident, then, that the proposition $1 + 1 = 2$ is true only in so far as the units which constitute the sum maintain their respective identities. By ‘two’ we mean the whole which results when one unit is considered together with another unit, while at the same time each of the units receives separate recognition. But what sort of a whole results when the units are treated in this way? Unless we know this, ‘two’ is merely an empty name, like the algebraic x . In order to know the nature of the whole in question, we must get our clue in some way from immediate experience. The ultimate meaning of ‘two,’ therefore, is the unique experience of duality which results whenever the units are presented in the way just indicated.

This peculiar experience of duality, we find, results whenever two things are presented together, while at the same time they are distinguished from each other. So far as can be discovered, the color, size, spatial relations, or, in short, all the attributes of things, save the attribute of unity, are quite irrelevant to the result. That is to say, these other attributes can all be varied

* James, *Psychology*, Vol. II., p. 655.

without affecting the relation in question. It seems, then, that the proposition $1 + 1 = 2$ depends for its proof upon the elimination of irrelevant circumstances, an elimination which is accomplished by means of the Method of Agreement.

In objection to this conclusion the point may be raised that in the case of other universals it is possible to imagine exceptions, while this is not possible in mathematics. We can easily imagine an unsupported body remaining stationary a few feet from the ground; we are quite unable to imagine that two objects, if presented in the manner described above, should give us the experience of 'three.' This difference, however, is easily explained. Mathematical propositions apply not only to physical objects, but to mental objects as well. An imagined violation of the law of gravity would not constitute an actual violation; whereas an imagined violation of the law of numbers would, from the nature of the case, be a real violation. The law of numbers is supposed to hold good for all kinds of countable things whatsoever, whether these things be real or imaginary. If, therefore, an exception could be imagined, this very fact would prove the universal to be untrue. To conclude, then, the universals which constitute the foundations of mathematics are, according to this view, the same in kind as all other universals. The difference between them is not a difference in the method of verification, but a difference in scope and in the readiness with which the subject-matter lends itself to our method of treatment.

CHAPTER X

THE PROOF OF CAUSAL CONNECTIONS

We have seen that a relation is universal if none of the accompanying circumstances affect it in any way. Universal propositions, however, are relatively few in number. Many propositions—of which popular maxims furnish examples—are *general* but not universal; they apply to a certain indeterminate number of a class, but not to the whole. Or, since universals are commonly called generalizations, we may distinguish these others as 'loose' or 'rough' generalizations. They lack the quality of universality, because they are abstract, i.e., because they point out only a part of the circumstances, conditions, or attributes to which the predicate in question is universally related. 'Haste makes waste,' is a proposition which states only a part of the truth. Haste by itself is not universally accompanied by waste, but haste plus certain circumstances, or haste under certain unspecified conditions. The total fact that is always accompanied by waste is a complex affair, of which haste is only a part or element.

Causation.—It is one of the most common experiences of life that if a certain circumstance or condition be added to certain other circumstances or conditions, a certain result will occur which does not occur as long as these other circumstances are

left to themselves. Such a circumstance is called a cause. In this sense haste is the cause of waste. In the common usage of the term, a cause is only a part of the totality of conditions with which the result is invariably conjoined. Sometimes, indeed, we speak of this totality of conditions as the cause of an event, in which case we are apt to designate it as the total or complete cause. Usually, however, the term cause is used for that circumstance or condition which is the immediate occasion of the phenomenon or event.

Two things require notice at the outset. In the first place, the study of causal connections (unless by cause we mean 'total cause'), is not concerned with the proof of universal propositions, i.e., generalizations which admit of no exceptions, but with the analysis of the fact A which is universally conjoined with the fact B. The fact A being complex, we try to ascertain what constituents are involved. If all these constituents can be analyzed out, we are in a position to advance a universal proposition, viz., that whenever all these conditions are realized, a certain result will invariably occur. The study of causation is the study of the elements involved in universal connections. It will be noticed, therefore, that in the study of causation the principle of uniformity is presupposed. As long as some only of these constituents are found, we must be content to say that these constituents *tend* to produce this result, or that they are a *cause* of this result, or that they will produce this result *other things equal*. In this way propositions originate which are general but not universal; and, as we shall see more fully later on, they are of great

importance in the proof of particular facts. In the second place, we should notice that, while in the study of classes and of universal propositions we tend to emphasize resemblances rather than differences, the reverse is true when we pass on to the consideration of causation. We can discover causes only by noticing the difference between those cases in which the cause is present and those in which it is not. But as was said before, resemblance and difference imply each other. While one may be emphasized more than the other, neither one is ever in sole possession of the field.

Group Comparisons.—It was stated just now that we analyze out causal connections in order to ascertain the constituents of the total fact A, i.e., in order to differentiate between those circumstances which are connected with the result and those which are accidental. Thus, the flame that explodes the powder is causally connected with the result, while the color of the burning match is not. But it may be a matter of considerable difficulty to ascertain whether a given circumstance is causally connected with the result or is merely accidental. This difficulty may be made clear by an example. It has long been a subject of debate whether vaccination is causally connected with immunity from smallpox. It may be granted at once that vaccination is not the 'total cause' of such immunity. At best it is a cause of immunity in conjunction with other conditions, for people who are vaccinated are sometimes taken with the disease. Vaccination, then, is not more than a part of the total cause. But is it even this? Is it causally related at all?

The question is pertinent because there is involved no universal rule. Some persons who have been vaccinated are attacked by the disease, while others who have not been vaccinated remain exempt. It is easy indeed to ascribe the credit to vaccination when a vaccinated person escapes the disease, and to make appeal to fortuitous circumstances when the unvaccinated person is equally fortunate, but to do so is to assume the point at issue; it does not prove that the connection is anything more than accidental conjunction. The vaccination may have been of as little protection to the person concerned as the color of his hair or his opinions on Italian art.

If we were confined to the consideration of individual cases it would frequently be impossible to arrive at a conclusion. But a conclusion may be possible if we group our cases into classes. In the present instance we should form two classes, the one consisting of the vaccinated, the other of the unvaccinated. Now if, instead of comparing individuals, we compare these two groups, we are likely to fare much better. It is true that in the group of the vaccinated there may be many who were taken with the disease, while in the other group there are many who remained in good health. But which group *as a group* can make the better showing? If we should find that among the unvaccinated the rate of attack is much greater than among the vaccinated, we should take this as evidence that there is a causal relation between vaccination and immunity from smallpox.

In the above illustration we start from the alleged cause—vaccination—and proceed towards the alleged effect—immunity. On occasion, however, it may be

equally easy to move in the opposite direction. City authorities, for example, may first have their attention called to a sudden increase in the death rate in the city or in some part of the city, and by the comparison of different groups this fact may then be found to be conjoined with a change in the water supply or with the introduction of milk from a new source. The groups compared may be the population of the entire city for this year or this period, as compared with the population for some previous period, or it may be the population of a certain ward or section as compared with the rest of the city. This procedure is sometimes known as group comparisons, and it is fundamental to the science of statistics. It is applicable to a wide variety of subjects. It may be used, for example, to prove that there is a causal connection between the failure of crops and crime, between north winds and cool weather, between drinking coffee and sleeplessness, etc. Moreover, a group may consist of many different individuals, as when we compare the vaccinated with the unvaccinated, or it may consist of different events occurring in connection with the same individual, as when we conclude that coffee is the cause of our sleeplessness. Group comparisons, moreover, may sometimes establish causal connections, as, e.g., between poverty and drink, but without determining which is cause and which effect, because the facts are not presented in a temporal order.

Forms of Group Comparison.—While group comparisons are made with reference to some specific character or attribute, this comparison may take either of two forms. We may place in one group all the instances in which the character appears and then

try to ascertain what other character is paired off with it. This occurs, for example, if we try to determine whether coffee is the cause of sleeplessness. Or, secondly, we may take an average of a given group and compare it with some other average, as when the average wages of a certain period are compared with the average wages of some other period, in order to determine the influence of a protective tariff or of the introduction of labor-saving machinery. The average may not fit any one case precisely, but may nevertheless serve to point out a causal connection. Similarly, the character that is found to be causally connected with the first character may qualify the group as a whole—e.g., a low death rate—but not the individual members.

The Method of Difference.—We are now ready to state the method by which causal connections are determined. After the group has been formed with reference to a given character, we seek for the concomitant of this character. The comparison of the groups shows that these two characters vary together, being present in the one group and absent from the other. Thus vaccination and low death-rate (or low rate of attack) mark the one group as compared with the other. The groups are alike in many respects, but it is the difference between the groups, and not the resemblance, that counts; and so the method which underlies the procedure has been called the Method of Difference. It has been stated by Mill as follows: “*If an instance [or group of instances] in which the phenomenon under investigation occurs, and an instance [or group of instances] in which it does not occur, have every circumstance in common*

*save one, that one occurring only in the former; the circumstance in which alone the two instances [or groups of instances] differ is the effect or the cause . . . of the phenomenon."** This statement, it may be noticed, is so worded as to include the application of the method not only to groups but also to single instances; an application which will be considered later. The method has been stated more concisely in this way: "Whatever alone is present in a case when the phenomenon to be investigated occurs, and absent in another, when that phenomenon does not occur, other circumstances remaining the same, is causally connected with that phenomenon."† According to this method only one circumstance must be found to vary with the phenomenon under consideration. If more than one circumstance varies, the conclusion is not valid.‡ If we compare this method with the method discussed in the preceding chapter we find that the Method of Difference varies only one circumstance, whereas the Method of Agreement attempts to vary all the circumstances except one.

In principle the Method of Difference is very simple, but in practice the application may be very difficult. Certain fallacies occur with sufficient frequency to merit special attention. These are:

I. Plurality of Points of Difference.—The first source of error consists in varying more than one point of difference. If the comparison of the two groups shows that one of the groups has the char-

* Mill, *System of Logic*, Book III., Chapter VIII., § 2.

† Creighton, *An Introductory Logic*, p. 205.

‡ For an illustration, cf. *Forum*, Vol. 26, p. 354, Article, "Does College Education Pay?"

acters A and B, while the other is like the first, except in the fact that it has neither A nor B, we assume a causal connection between A and B. It may happen, however, that, besides A and B, there is present a third character C, which we have overlooked. The one group, then, has A, B, and C, while the other group has none of the three. In this case we may be unable to infer to a causal connection between A and B, since the connection may lie between B and C, leaving A causally independent of the two.

As an exemplification of this, we may cite an inference that was supposed to be warranted by the experience of one of our larger cities, which had voted to increase materially the price of liquor licenses. The police records, for the period immediately subsequent to the time when the new law went into effect, showed a distinct decrease in the amount of crime. By the method of difference we should naturally attribute this fact to the high license. But it was found that after the election the officials who issued the licenses had been much more careful than before to issue licenses only to applicants of good moral character. This fact alone might account for the decrease in crime, leaving the higher license without effect upon the result.

How easily group comparisons may suggest fallacious inferences appears from the following: "Contrary to the popular idea there are not so many wealthy Jews in proportion to the population as there are non-Jews. It is said that there are four thousand millionaires in New York [City], and as the Jews form 20 per cent. of the population, there should be

eight hundred Jewish millionaires. The fact is that there are not two hundred, and even these are only moderately millionaires." While the article * in which this passage occurs makes no further comment upon this difference between the Jewish and the Gentile population, one might be tempted to take it as an indication that the Jews are an inferior class in the commercial world. There are, however, important points of difference to be considered. In the first place, New York, being a large commercial center, is a point towards which the millionaires of the entire country naturally gravitate. Hence the number of millionaires in New York city is determined in part by the size of the population from which it can draw its millionaires. Now the article just mentioned informs us that "The Jews in the United States number not more than a million and a half. As New York is the chief port of entry of the country, and at the same time the metropolis, fully one-half of all these Jews are living permanently in New York." In other words, New York city contains about 5 per cent. of the Gentile population of the United States, whereas it contains 50 per cent. of the Jewish population. Hence the Jewish population outside of New York city can contribute relatively fewer millionaires than can the Gentiles.

A further point of difference is implied in a passage which speaks of "the tremendous influx of hundreds of thousands of more or less friendless and helpless Russian and Roumanian Jews within the last twenty years." Owing to this great influx it would obviously

* *New York Independent*, Nov. 30, 1905, Article, "The Jew of To-day" (p. 1272).

be unfair to draw inferences as to commercial ability from a comparison of the Jews with the rest of the population, since the latter, taken as a whole, has had a better opportunity to acquire wealth.

II. Plurality of Causes.—The second of these fallacies is really a special form of the first. We may, for example, attribute our sleeplessness to coffee, on the ground that if we put together those occasions when we drank coffee the sleeplessness was present, while on the other occasions it was not. Or it may be argued that it is a good practice to restore convicts to freedom on parole, the reason given being that of the criminals thus treated a low percentage revert to crime as compared with those who are compelled to serve out their sentence and are then released without condition. This may seem conclusive, and yet the parole system might have nothing to do with the reform of the prisoners, and the coffee might have nothing to do with the sleeplessness. It may be that of the convicts upon whose records we base the conclusion one was kept from temptation by a friend, a second largely through absence of opportunity, while a third was reformed through religious influences, and so on. Instead of one cause there may be a set of causes, all tending towards the same result. The character or circumstance that they have in common may have no connection whatever with this result.

This error, however, is likely to occur only if the group in question contains but few members. Where but few cases are concerned, the conjunction of the two characters which are common to the group and which are erroneously supposed to be causally connected, may be a mere coincidence. We must allow

for the possibility that the convicts who were unusually fortunate after being released from the penitentiary merely happened to be the same as those who were released on parole. Similarly, a teacher may assume that the disturbance which occurs shortly after a certain boy entered the room merely happens to occur at that time. But if this happens time after time—i.e., if the group of occurrences becomes large—it finally becomes impossible to ascribe the conjunction to coincidence.

It may be said that this error could not occur if we had really conformed to the requirements of the method, since it is stated that the conclusion follows only on condition that 'other circumstances remain the same.' This objection is undoubtedly correct. The plurality of causes is an error that can arise only under an imperfect application of the method. It may be replied, however, that this imperfection of application is not merely accidental. The Method of Difference, like the Method of Agreement, involves an ideal of proof that can never be fully attained in practice. Since every individual member of a class has something about him which is unique and which is therefore not found in the other class, it is impossible to have all the circumstances the same. Moreover, it is never possible to have a complete knowledge of all these other circumstances. As the method is actually employed, this proviso as to 'other circumstances' is taken to mean, '*all other circumstances remaining the same, in so far as they might be supposed to be relevant to the situation.*' Here again we must substitute for complete proof an appeal to the principle that all doubt must be motivated. When

we fall into the error called plurality of causes, we vary more than one circumstance, and this circumstance is a different one for each of the cases.

III. Merely Apparent Point of Difference.—A third error that is sometimes committed in connection with this method consists in comparing groups which appear to differ in a certain respect when in reality they do not. This fallacy is the opposite of the foregoing. Instead of comparing groups which differ in more than one important respect, we compare groups with respect to a merely apparent point of difference. Some time ago, for example, the United States census reports indicated a rate of increase among negroes that was much greater than that among whites. This indication attracted much attention and caused some alarm. It was found afterwards, however, that the difference in the groups was due to the manner in which the figures were taken. The earlier censuses had been taken rather carelessly, so far as the negro population was concerned. The later figures were the outcome of greater effort and care, with the result that many colored people were included who had not been counted on the previous occasions.

In a similar way later censuses have shown a decided increase in the number of infirmities, such as blindness, deafness, mental feebleness, etc. These infirmities were apparently growing faster proportionately than the total population. This is now explained by the fact that the figures for such infirmities are more easily obtained than formerly, because it is now more customary to have such cases cared for in hospitals and special institutions.*

* *Forum*, Vol. 31, p. 683, Article, "Statistical Blunders."

The following newspaper editorial, entitled, 'Is Crime really Increasing?' illustrates both the necessity of having a sufficient number of instances before we can infer a causal connection and the fallacy of drawing an inference from a merely apparent point of difference:

"The police report of the city of Washington once contained the statement that during the previous year 300 per cent. of the Turks resident in our national capital had been arrested. Further investigation revealed the fact that the number of Turks resident in our national capital was one. This Turkish population of one had been arrested three times. . . .

"A few months ago in Chicago there was a great deal of talk about the 'increase in crime.' Several holdups had occurred almost simultaneously. It is difficult to persuade holdups to follow each other with due regard for precedence. They simply will not maintain the decent intervals which the procession of averages requires. They come in bunches. The consequence of the bunch which arrived in Chicago at the time in question was that police officers were interviewed, sermons were preached, and an anti-crime committee was organized. The newspaper men who worked on crime at that time will remember that the actual proofs of an increase in crime were most humiliatingly difficult to discover. Chicago has no body of statistics covering either enough ground or enough time to make generalizations possible.

"The number of arrests means very little. It may be the result of exceptional laxity or of exceptional severity on the part of the police. And thousands of persons who have been arrested are released without

records sufficient to establish either their guilt or innocence." *

Inference to Other Cases.—It was stated that the proof of a causal connection gives us only an abstract or 'loose' generalization. In order, therefore, to extend our results to other cases we must be sure that these are in all essential respects like the one which we have studied and which has yielded evidence of a causal connection. Thus we may ascertain by the Method of Difference that in some specific case the number of arrests for drunkenness is causally connected with the amount of liquor that is consumed in that particular locality. If, therefore, two localities are found upon comparison to differ considerably in the number of arrests for drunkenness in proportion to the total population, the inference is naturally drawn that in the one with the greater number of arrests drunkenness is a more common occurrence than in the other. As was pointed out, however, in the discussion of relative terms, this inference assumes that the attitude of the police is the same in the two places, which may not be the case. There may be relatively fewer arrests in the 'wide-open' town, just because the police takes no notice of any but the most flagrant cases. The inference which passes from number of arrests to amount of drunkenness assumes both that there is the same standard for what is meant by drunkenness and that there is the same diligence in the enforcement of the law. Unless these assumptions are true, the inference does not follow.

In a college debate, some years ago, on the restric-

* Cf. also *Forum*, Vol. 29, p. 596, Article, "Is Crime Increasing?"

tion of immigration by means of an educational test, the side favoring such a test lost the debate because it assumed that the results of group comparisons could be generalized indefinitely. Such comparisons in countries like the United States, England, and Germany show a connection between illiteracy and crime. In these countries a high percentage of illiteracy in any given group signifies a high percentage of crime. It was supposed that the same must be true of countries like Hungary and Russia; which is not necessarily the case, since the difference in educational conditions in these latter countries makes illiteracy a much more uncertain index to moral character.

The Proof of Causation as Dependent upon Number of Instances.—In group comparisons the purpose of bringing together a number of instances is to eliminate irrelevant circumstances. The circumstance that is common to all the cases is causally connected with the phenomenon, provided we have cases enough to guard against plurality of causes and to make sure that there is no other common circumstance which might account for the facts.

We may now raise the question how many instances are necessary in order to achieve this result. It has already appeared that we cannot rely upon numbers alone. It is never possible to comply fully with the demands of the Method of Difference. So instead of varying all the circumstances but one, we fall back upon the principle that all doubt must be motivated. There must be something about the situation that gives warrant to the doubt. The result is that some inferences may be proved by fewer instances than others, because in some cases a justifiable

doubt is easily removed, while in others it is not. Or, to put it differently, there are situations in which it is comparatively easy to show that there is no reason to think that other circumstances have not remained the same, while in others this is much more difficult.

As an illustration of this fact we may compare the proof by the Method of Difference that pistol-shots produce death or that pin-pricks produce pain, with the proof that tariff causes prosperity or that a certain drug cures an ailment. With the same number of instances we may have very different degrees of proof. The prosperity may well have been caused by a concomitant change in industrial or agricultural conditions, and the cure may be due to the faith of the patient in the efficacy of the remedy, or to the processes going on in the organism independently of the drug.

It would not be incorrect to ascribe this difference in certainty to the difference in the time-interval between the alleged cause and the alleged effect. A pistol-shot inflicts injury on the spot, whereas the effects of a tariff appear only after a considerable lapse of time. This longer interval makes it possible for numerous other changes to occur, and these changes may have a bearing upon prosperity. The relation, therefore, between tariff and prosperity may be nothing more than a coincidence. Since prosperity may occur without any tariff, we know that a tariff is not an indispensable condition. On the other hand, to suppose that the effects of the pistol-shot are due to other and unknown causes would be clearly unmotivated.

This time-interval, however, can reasonably disturb

our confidence only in so far as it furnishes other causes an opportunity to play a part in the result. If we happen to know enough about the situation to protect ourselves against this contingency, we may find that some inferences, in which a comparatively long interval is involved, are safer than others in which the interval is shorter. Thus we may feel more sure that sterilization or alcohol prevents decay than that a certain effect is due to a drug and not to some other cause. In other words, the time-interval is significant only in so far as we are unable to control the conditions of the result. In a properly conducted laboratory experiment, for example, there can be no reasonable doubt about the conclusion, even if considerable time is involved, whereas this is not true in the case of experimental legislation.

It appears, then, that our confidence in the results obtained by the Method of Difference is properly determined more largely by our knowledge of other possible causes than by the mere number of instances. Unless we bring some knowledge to the situation, the method cannot be applied at all. The more knowledge we possess the less we are dependent upon numbers. A single instance is just as valuable as a great number, if we can make sure that there is only one circumstance which varies with the phenomenon. We have already noticed that the Method of Difference may be applied to single cases as well as to groups. But if a single instance is to be conclusive, it is ordinarily necessary that we introduce the cause ourselves and then observe that the effect follows at once, i.e., we must resort to experiment. If experiment is impossible, as, e.g., in the study of the relation between

the prices of food and number of marriages, or if experiment is indecisive, because the relation of cause and effect is too indirect or long-delayed, as in vaccination or prohibitive legislation, we must rely upon numbers to make good the deficiency. Situations may occur, therefore, in which a single instance is sufficient to prove the point. This is more particularly true under laboratory conditions, where all the essential circumstances are under our control. It should be added, however, that such situations are, after all, rather exceptional. Even in the best-regulated laboratory experiment the experimenter is pretty sure to verify his results by the repetition of the experiment, and frequently he is not entirely easy until he learns that his co-workers in the same field have been able to get the same results. Ordinarily we all insist upon repetition in the case of new causal relations, and the more strange they are the more we feel the need of corroborating evidence. In general we may say that the number of cases necessary to prove a causal connection varies in inverse ratio to our knowledge of the conditions.

This need of further proof, i.e., of more instances, is due, of course, to the fact that we are not sure whether the two cases compared possess only a single point of difference. The elimination of other possible points of difference must be done through the medium of numbers, if we do not feel sufficiently sure of the single experiment. An experiment is nothing but an observation that occurs under unusually favorable conditions, viz., conditions that are under our own control. This control, however, is a matter of degree, and for this reason we may find it necessary to pro-

tect ourselves against the operation of circumstances which have escaped our notice, i.e., to make sure that the two cases possess only a single point of difference. There is a constant tendency to overlook as irrelevant all circumstances except those in which we are directly interested, and thus to incur the risk of varying more than one factor. This is well shown in the following quotation: "When Pasteur was investigating the causes of splenic fever, he adopted very early in the inquiry the theory of Dr. Davaine, that the disease was due to the presence of a certain parasite in the blood, and that consequently the same disease, showing the presence of the same parasite, could be communicated to other animals by inoculation. On the other side, two professors, to whom the theory did not commend itself, brought forward, as a triumphant refutation of it, what seemed at first a plainly contradictory fact. They had inoculated some rabbits with the blood of an animal which had died of splenic fever, and though the rabbits had died very rapidly, no trace of the expected parasite had been found in them, either before or after their death. Moreover, their blood again had been used to inoculate other rabbits, and these too had died in the same rapid manner, but with the same disregard of what the theory further required. Davaine at once disputed the *fact*. That is to say, he insisted that the two professors must have used blood which was not properly infected with splenic fever, but with some other disease. The professors, however, were equally certain of their facts; they had got their materials from the best available source, namely, from the director of an establishment where numerous animals which had

died of splenic fever were constantly brought. But in order to convince the stubborn theorist they tried the experiment again, this time obtaining their materials from the most experienced veterinary surgeon in the neighborhood. Exactly the same result followed, and the facts certainly here appeared to be too strong for the theory.

“It was some years later when the real weakness of the facts themselves came to light. Davaine’s theory had meanwhile been enlarged and improved by the discovery that, if the blood used for inoculation has already begun to putrify, the animals inoculated will die by a form of blood-poisoning, quicker in its operation than splenic fever, and too quick to allow the true splenic fever parasite time to multiply. This suggested a new inquiry into the professors’ experiments, and it was found that the blood used by them, although certainly taken from cases of splenic fever, had not been sufficiently fresh. So that the fact on which they had relied as contradicting the theory turned out to be wrongly—i.e., incompletely—described. Through merely overlooking the detail that the animals whose blood they used had been dead some twenty-four hours, their description of it as ‘splenic fever blood’ became essentially false.”*

When dealing with single instances we incur the same danger as in group comparisons, viz., the danger of extending our inference to cases which appear to be essentially the same but which differ in important respects. It was by an oversight of this kind that the spontaneous generation of life was once supposed to have been proved. With regard to the evidence

* Sidgwick, *Process of Argument*, pp. 95-97.

upon which this conclusion rests, a critic says: "The proof of Bacterial death at 140° Fahr. consists solely in the observed fact, that when *a certain liquid* is heated to that temperature no life appears in it afterwards; while *in another liquid* life appears two days after it has been heated to 212°. Instead of concluding that in the one liquid life is destroyed and in the other not, it is assumed that 140° Fahr. is the temperature for both; and this being so, the life observed in the second liquid is regarded as a case of spontaneous generation."* The original experiment was supposed to prove a causal relation between the origin of life and conditions which did not involve the presence of living organisms. The experiment was inconclusive, because it was based upon a false generalization involving the assumption that living organisms had been eliminated from the substances used in the experiment.

Concomitant Variations.—The Method of Concomitant Variations, as it is sometimes called, is not a radically new method, but merely a special application of the Method of Difference. By the Method of Difference we can establish causal relations, on the basis of the fact that the qualities or attributes so related are found to be present and absent together. Now it sometimes happens that the variations are of a quantitative character. If when one of the two attributes varies in the way of less and more, the other attribute is found to undergo variations, we infer that they are causally connected, and the proof is said to be based upon the Method of Concomitant Variations.

*Quoted by Sidgwick, *Fallacies*, p. 280.

The following formulation is the one offered by Mill as a definition of this method: "*Whatever phenomenon varies in any manner whenever another phenomenon varies in a particular manner, is either a cause or an effect of that phenomenon, or is connected with it through some fact of causation.*" *

The application of the method is excellently illustrated in the following quotation: "The illustrations of this law are infinitely numerous. Thus Mr. Joule, of Manchester, conclusively proved that friction is a cause of heat by expending exact quantities of force by rubbing one substance against another, and showed that the heat produced was exactly greater or less in proportion as the force was greater or less. We can apply the method to many cases which had previously been treated by the simple method of difference; thus instead of striking a bell in a complete vacuum, we can strike it with a very little air in the receiver of the air-pump, and we then hear a very faint sound which increases or decreases every time we increase or diminish the density of the air. This experiment conclusively satisfies any person that air is the cause of the transmission of sound.

"It is this method which often enables us to detect the material connection which exists between two bodies. For a long time it had been doubtful whether the red flames seen in total eclipses of the sun belonged to the sun or moon; but during the last eclipse of the sun, it was noticed that the flames *moved with the sun*, and were gradually covered and uncovered by the moon at successive instants of the

* Mill, *System of Logic*, Book III., Chapter VIII., § 6.

eclipse. No one could doubt thenceforth that they belonged to the sun.

“ Whenever, again, phenomena go through *Periodic Changes*, alternately increasing and decreasing, we should seek for other phenomena which go through changes in exactly the same periods, and there will probably be a connection of cause and effect. It is thus that the tides are proved to be due to the attraction of the moon and the sun, because the periods of high and low, spring and neap tides, succeed each other in intervals corresponding to the *apparent* revolutions of those bodies round the earth. The fact that the moon revolves upon its own axis in *exactly* the same period that it revolves round the earth, so that for unknown ages past the same side of the moon has always been turned toward the earth, is a most perfect case of concomitant variations, conclusively proving that the earth’s attraction governs the motions of the moon on its own axis.

“ The most extraordinary case of variations, however, consists in the connection which has of late years been shown to exist between the Aurora Borealis, magnetic storms, and the spots on the sun. It has only in the last thirty or forty years become known that the magnetic compass is subject at intervals to very slight, but curious movements; and that, at the same time, there are usually natural currents of electricity produced in telegraph wires, so as to interfere with the transmission of messages. These disturbances are known as magnetic storms, and are often observed to occur when a fine display of the Northern or Southern Lights is taking place in some parts of

the earth. Observations during many years have shown that these storms come to their worst at the end of every eleven years. . . . Close observations of the sun during thirty or forty years have shown that the size and number of the dark spots, which are gigantic storms going on upon the sun's surface, increase and decrease exactly at the same periods of time as the magnetic storms upon the earth's surface. No one can doubt, then, that these strange phenomena are connected together, though the mode of the connection is quite unknown." *

It should be remembered that this method involves no new principle. While usually called the Method of Concomitant Variations, it is merely the Method of Difference as applied when the variations are quantitative in character. Here again the inference to a causal connection is justified only if there is reason to think that no relevant circumstance has been overlooked. The Method of Concomitant Variations is applicable to the comparison of groups as well as to the different states of a single case of phenomenon. We may find, for example, that there is a certain quantitative relation between the failure of crops and the number of crimes, or between illiteracy and pauperism. Of course, the correlations in such cases is not apt to be very precise in its quantitative aspects. Generally speaking, precision is possible only when we approximate laboratory conditions and study single instances. In the laboratory, as well as in statistical science, the Method of Concomitant Variations is of extreme importance, because science aims

* Jevons, *Lessons in Logic*, pp. 249-251; quoted by Creighton, *Logic*, pp. 212-213.

at quantitative relations wherever these can be ascertained. Success in this direction is an index of perfection, and so it is not surprising that, in proportion as a science develops, it tends to establish more and more intimate relations with mathematics.

CHAPTER XI

PROBABILITY

In the preceding chapters we have studied the methods by which universal propositions are established and causal connections ascertained. A universal proposition concerns an entire class, since it asserts that the predicate of the proposition pertains to each member of the class. A statement of causal connection is, as a rule, less definite on the side of extension or denotation. That sunshine causes plants to grow is not universally true, but only if certain conditions of soil, moisture, etc., are realized. In other words, a proposition which affirms a causal connection implies a proviso, such as, 'under ordinary conditions,' or 'other things equal.'

The number of strictly universal propositions that can be made is relatively small. Nearly all rules have exceptions, and statements concerning causation rarely claim universality. It is, therefore, a problem of some importance to ascertain how we can make assertions about individual facts. In so far as the individual fact comes under a known universal rule there is no occasion for difficulty. If smoke is an invariable sign of fire, it is easy, in any particular case of smoke, to draw the appropriate inference. But if the rule that we are forced to employ admits of exceptions, there appears to be no guarantee that

the case before us is not one of the exceptions, and inference becomes hazardous. Thus banks are reliable institutions, as a rule, but this is small comfort to the person who has on a previous occasion reposed his trust and his money in the institution that violated the rule. What he now wishes to know is whether this particular bank is trustworthy. Stated more generally, the question is how we are to proceed in the absence of reliable universal rules.

It is evident that this question is intimately concerned with our everyday conduct. If, for example, an individual expects to live another year or another decade, he may go on with his education, contract obligations extending over long periods of time, build a house according to his private notions of comfort, and do many other things that he would not do if he entertained the prospect of an early dissolution. But his expectation is clearly not based on any universal rule, since many persons of his age, station, and condition of life die at an earlier time than he allows for himself. Upon what grounds are such expectations properly based?

Judgments of Probability as Based upon Classes.—Since inferences based upon a universal connection cannot be obtained in the situations typified by the foregoing illustration, we must content ourselves with second best. Between complete assurance and complete ignorance lies the domain of partial assurance, ranging all the way from one extreme to the other. One way in which this partial assurance, which is known as probability, may be obtained, is by a study, not of the individual directly, but of the class to which he belongs.

By a study of the class many questions may be tentatively answered, when complete knowledge is lacking. To recur to our illustration, the average individual of twenty-five or thirty years, if he is of sound health, has a strong expectation that he will live through another year, although he does not even try seriously to trace out the conditions involved. Instead of this, he is apt to refer to the fact that the death-rate is low among persons of his age and general circumstances; in other words, that the deaths constitute comparatively rare exceptions to the rule. Because there are so few that die, his chances for survival are considered very good.

This type of reasoning is duplicated in many other instances. When we mail a letter we count pretty confidently upon its safe arrival. From time to time letters get lost, through carelessness, in railroad wrecks, or as a result of other causes, but the number of those which get lost is so small a proportion of the total number that we treat it as practically a negligible quantity. For the same reason we leave out of account the possibility that at some time we shall be struck by lightning, or, when we make a journey, that our train will be wrecked, or that our home will be destroyed by an earthquake, or that the stranger of whom we make inquiries as to directions will be insolent or show annoyance. If, in each case, we take the class as a whole, there is a certain percentage of results one way and a certain percentage the other way—e.g., a certain percentage of letters arrives safely while a certain other percentage does not. Of course, we frequently do not know the proportions with any such accuracy as is embodied in

a statement of percentages. But this is, in a sense, merely incidental. Our inference and our conduct are determined by our conception of these proportions, in that we consider the 'chances' greater to the degree that the proportion preponderates in a given direction. If there is no preponderance, we say that the 'chances are even.' There are as many cases on the one side of the line as on the other. The statistical work which seeks to state the respective results in terms of percentages merely makes our estimate of the chances more definite than they were before.

The Constancy of Classes.—If we are to determine from the study of classes the probabilities of their individual members, there must be a certain constancy in the behavior of the class as a whole. Within certain limits this requirement is met remarkably well by the facts. "The total number of crimes is approximately the same year after year; the annual death-rate, the apportionment of deaths, moreover, to the several diseases as their evident causes, the number of missent letters that reach the Dead Letter Office at Washington each year, the annual number of suicides, of divorces, all these diverse events indicate a regularity, in the long run, as regards their numerical estimate."* As another writer says, more graphically: "With astonishing precision year follows year in the assigned causes of fire [in New York City]. 'Carelessness with matches' always leads by the inevitable percentage, and so in sequence: 'Children playing with fire,' and 'Cigar and cigarette ends falling through gratings.' So, too,

* Hibben, *Logic*, p. 338.

Jewish Sabbath lights, and Italian tapers carelessly burning under Saints and Madonnas, kindle their calculable yearly tale of horrors. And, by some iron decree, the average annual loss for each fire mounts unfailingly to \$680, and varies but \$1.50 in two years. And then there is that persistent daily mean of thirty alarms. As you watch the numbers click to their calls, you may think to see the hours playing for victims a ghastly red-and-black of their own—a roulette of demons.”*

It is on the basis of this regularity that life insurance companies transact their business. Owing to the constancy of classes it is comparatively easy to fix a schedule of premiums that will allow a safe margin for the company. It should be noticed, however, that the company which issues the policy is not on the same footing as regards probability with the individual to whom the policy is issued. The class as a whole being approximately constant, the company knows in advance just about what to expect. What the company does not know is which of the members will be the ones to die, but, from the standpoint of the company, this is a matter of indifference.

The reason why we ever seek to determine probability by a study of classes is that the causes which decide the fate of the individual member are either too complex or are entirely unknown to us. The study of classes is a sort of short cut to the result, a more or less artificial simplification of a problem too complicated for us to handle in any other way. For example, let us suppose that some one should

* J. F. Carr, “Fighting the Fire,” *The Outlook*, March 28, 1908.

try to determine, without resort to statistics, whether a given letter will arrive at its destination. In order to rule out the chances of a railway wreck, he would have to consider the fitness of the train crew, the state of the roadbed, the condition of the rolling stock, the danger of washouts, and, in short, the entire management of the road. This would be only a part of the work. The United States postal service would next require examination, to ascertain whether it could be intrusted with the letter, and particularly the mental peculiarities of the employés whose duty it would be to handle this letter. A study of this sort, no matter how far it was carried, would be quite as likely to lead to bewilderment as to any tangible results, if there were no statistics to guide our expectations.

The Nature of Probability.—It may seem a little peculiar that the chances or probabilities in two cases may be the same, while the outcome is very different. Thus the chances of its safe arrival may be as great for the letter that is lost as for any other. This, however, can be occasion for surprise only if we treat ‘chance,’ which is properly an abstraction, as though it were a concrete agency or force, struggling for the attainment of a certain end. For this reason, apparently, an unusual combination of circumstances is apt to be regarded by the individual, cheerfully or somberly, according to the nature of the case, as, ‘just his luck,’ and as something more potent than everyday natural causation. This may happen, for example, if a combination of circumstances causes him to miss the steamer which is lost at sea on that selfsame trip; or if a storm demolishes his house without injuring

any other buildings. It is well known that gamblers as a class are much disposed to regard 'luck' in this semi-superstitious way.

How the probabilities may be the same in different instances without a corresponding sameness in outcome ceases to be a mystery if we bear in mind that probability is not the name of an agency, nor yet a name for our ignorance, but a forecast that is based upon partial knowledge. If our knowledge were complete, the term 'chance' would presumably disappear from our vocabularies. But it is also true that we cannot speak of chance unless we have some knowledge of the situation in question. We speak of chance or probability because we have some knowledge, but not as much as is necessary for certainty. Probability may, therefore, be defined as the *degree of expectation that is warranted by the premises*.

From this definition it is evident that probability merely tells us what we have a right to expect in view of what we know. If we know nothing further than that the percentages of the class in question show a preponderance of results in a certain direction, we are required by our data to expect that the result thus indicated will occur in the case of any designated member, the proper degree of expectation being determined by the measure of preponderance. When we say that the probabilities of safe arrival in the case of different letters are equal, we do so because our information is limited to the fact that they both belong to the same class. 'Probability is the guide of life'; and if we act upon the information that we have, we shall be right oftener than wrong.

How Probability is Made More Accurate.—

Estimates of probability that are based on our knowledge of classes may be made more accurate by more painstaking classifications. The exceptions to the rule then become relatively fewer. If we happen to know nothing about a man except that he is thirty years of age, the probability that he will live another decade or another year will be determined by the mortality tables for the entire class of men thirty years old. But if we find that his health is excellent, we are able to classify him with a smaller group. From the group of persons thirty years old we eliminate all those who do not enjoy good health, with the result that the death rate decreases for those who remain; and if he is engaged in a healthful occupation, has good habits, and comes of a long-lived stock, the group becomes still smaller, with a constant decrease of the death rate. Similarly our trust in a bank may be increased when we discover that it is not only under state control, but under the management of responsible men and conservative in its methods.

The Principle Implied in Estimates of Probability.—The principle implied in judgments of probability is that if a particular case is like others in certain respects, we may take this resemblance as a ground for expectation, even though we are not acquainted with all the conditions that determine the result. We spontaneously generalize from the previous experiences to the present experience. This is not only justifiable but necessary, because we can never ascertain the totality of conditions for any event. If, therefore, we should refuse to accept partial knowledge, and to act upon it, life

would be impossible and knowledge an unattainable ideal.

The Function of Numbers in Estimates of Probability.—The function of numbers is twofold. In the first place, numbers serve to make our estimates of probability more definite. Where the classes are definitely marked off by easily recognizable likenesses and are sufficiently large in extent, as in the case of 'men,' 'railroad collisions,' 'divorces,' and similar groups, we tend to estimate the probability in terms of the ratio between the number of cases in which the result in question occurs and the number in which it does not occur. The basis of our judgments is indeed resemblance. We infer that because A has been attended by B in certain other cases, therefore B may be expected in the present case of A. Other persons who have made a journey have experienced the disasters of collisions, therefore the same may be expected by us, if we undertake to travel on a train. A comparison of figures, however, shows that the degree of expectation warranted by the resemblance is in this case very slight. The preponderance of probability is the other way. Secondly, a judgment may be corrected by numbers if we happen to infer from the wrong resemblance. Thirteen at table is followed by a death within a year in a certain case or cases, therefore the same may be expected in the present case. A sufficiently large group of thirteen-at-table cases, however, will serve to show that the number thirteen has no particular significance. Numbers of instances, therefore, may assist the judgment of probability in that they enable us, wherever necessary, to make sure of a connection between circum-

stance A and circumstance B. This help, however, is merely negative. If there is no connection, the basis for expectation is indeed taken away. But if, on the other hand, a connection is discovered, e.g., by group comparisons, we are not yet in a position to make a judgment of probability. This can be done only after we have some clue as to the ratio between the number of cases in which the given result occurs and the number in which it does not occur.

Probability as Based upon Individual Resemblances.—We have seen that in judgments of probability the ground for expectation is resemblance. The cases are put into the same class, because, so far as we know, they are alike in all important respects. Then when a new case presents itself, the probability that a given result will occur may be stated in terms of the percentages that have been obtained from the study of the class as a whole.

In this procedure two facts should be noted. The first is that our inference is based upon a generalization. A may be taken as a sign of B; not as an unfailing sign, indeed, but as a reliable sign in a certain percentage of cases. The second is that the inference assumes an essential likeness between the new case and the class of cases from which the estimate of probability is derived.

With regard to this essential likeness, however, difficulties may arise. By 'essential likeness' is meant complete similarity, so far as the purpose of the argument is concerned. Such likeness may be assumed, if no room can be found for a reasonable doubt. But we may have reason to suspect that the likeness of the present case to other cases is not the kind of likeness

which the inference requires. In order to make the difficulty concrete, let us recur once more to the inference that a given letter is likely to arrive safely at its destination. We may let A stand for 'letter,' and B for 'safe arrival.' The inference from A to B is then justified if the letter in question is just an ordinary sort of letter, with no peculiarity about it, so far as we know, which would be likely to make a difference in the result. If, however, the letter differs widely from ordinary letters in shape or size, or if the address is written very illegibly, or if the ink is of a kind that may fade in a very short time, we have a different problem on our hands. Or, again, it may be that the letter contains some fragile object, about the safety of which we are in doubt. In all such situations there may be numerous resemblances between this letter and other letters, and yet there may be ample ground for doubt whether this is a 'letter' in the sense which warrants an inference to 'safe arrival.' In other words, if the circumstances are widely different in the case under consideration, we may be uncertain whether the likeness is essential or merely accidental.

While it may be true, therefore, that A is a sign of B 'as a rule,' or 'under ordinary conditions,' we are not much comforted by this reflection, if we are uncertain whether the conditions in the present instance are of the usual kind. It is plain that our knowledge of the class cannot avail us much in dealing with a new case, so long as the reliability of the resemblance is in doubt. The soundness of the inference then necessarily depends upon the nature of the individual resemblances involved, i.e., upon the

resemblance which we discover on this particular occasion.

The reasoning which bases itself upon this kind of resemblance is illustrated in the argument about to be quoted. The argument is directed against the proposition defended by the American Colonies that 'Taxation without Representation is Tyranny,' and is intended to show that a colony has a right to a voice in its own government only so long as the supreme authority in the mother country sees fit to grant this right:

"An English colony is a number of persons to whom the king grants a charter, permitting them to settle in some distant country and enabling them to constitute a corporation, enjoying such powers as the charter grants, to be administered in such forms as the charter prescribes. As a corporation they make laws for themselves, but as a corporation subsisting by a grant from higher authority, to the control of that authority they continue subject. . . . The charter, therefore, by which provincial governments are constituted, may always legally, and where it is either inconvenient in its nature or misapplied in its use, may be equitably repealed."*

The essential point of this argument is that a colony is like a corporation. The latter is a special group of persons upon whom is bestowed a special right or privilege. The same is true of the colony. In the case of the corporation such special rights are subject to the pleasure of the authority by which they are granted. This is likewise true, therefore, of the colony. But if this be the case, then, according

* Johnson, *Taxation no Tyranny*.

to the argument, a colony can have a share in its own government only so long as the authority which granted the privilege does not choose to withdraw it. Colonies cannot claim participation in their own government as a right, but can enjoy it only as a special privilege.

This argument, as may easily be shown, rests upon a mistaken resemblance. It is doubtless true that both corporations and colonies may have special rights bestowed upon them and that these special rights may be terminated by the higher authority. If, however, the special rights of a corporation be taken away, the members of the corporation nevertheless retain their rights as private citizens. The charter refers to *special* rights, not to the rights of citizenship. Now while the charter of a colony may confer special rights upon a colony, the contention of the colonists in this case was not for any special right, but for the right of the individual colonists to citizenship. This point is entirely overlooked in the argument. The two cases compared resemble each other perhaps in the matter of special rights, and the generalization 'special rights may be taken away,' may hold for both. In the matter under discussion, however, the cases are entirely different, and the argument is, therefore, based upon a false resemblance.

It must be added that there is no difference in principle if we compare our new case, not with a class of cases in which the generalization holds true, but with a single case. Thus it may be argued that since Free Trade is desirable for England, it is desirable for America. Here again a generalization underlies the inference, viz., that Free Trade is desirable

or conducive to welfare. Assuming that a connection has been established between 'Free Trade' and 'welfare,' this connection may be inferred in other cases, if the conditions are essentially the same. This point has already been discussed on a previous occasion (*cf.* p. 136). The validity, therefore, of the inference depends upon the question whether the cases compared are alike in all important respects.

It has been shown that estimates of probability cannot be determined by what we know about a class of cases, so long as the reliability of the resemblance is in doubt. Whenever such a situation arises, we are obliged to study this resemblance, in order to ascertain, if possible, whether it will justify the inference. An argument that involves a resemblance of the kind just discussed, viz., a resemblance which occurs in contexts or settings so different from each other as to make the inference seem insecure, is called an inference from analogy.

The Nature of Analogy.—Reasoning from analogy has been defined as follows: "Two things resemble each other in one or more respects; a certain proposition is true of one, therefore it is true of the other." * This definition, however, does not point out explicitly that resemblance is a wider term than analogy. As Mr. Sidgwick says, "Where analogy is very close, and well tested, and familiar, as between cancer and cancer, or man and man, class-names have generally been invented. It is newly-seen likeness, doubtful likeness, or likeness where the examples are rare, that we have to recognize as well as we can without the aid of class-names. And it is to these kinds of like-

* Mill, *System of Logic*, Book III., Chapter XX., § 2.

ness especially that, as a rule, we give the name 'analogy.'''* As was indicated a moment ago, an argument that is based upon this kind of likeness is called an argument from analogy.

Analogy and Classification.—Analogy expresses our natural tendency to assimilate the new to the old, to interpret what is strange and unfamiliar in the light of what we already know. It may, therefore, be described as classification in the making. The resemblances which guide us are called analogies so long as they are newly-seen, rare, or doubtful; but as the number of cases increases, analogy passes by insensible stages into established classification. It is accordingly impossible to draw a hard and fast line and to say that analogy is operative on one side of it and classification on the other. A likeness about which we were in doubt at the outset, because not guaranteed by numbers, may become well attested in the end and acquire a class name of its own. Whether our inference be based upon an analogy or upon a familiar classification, the connection A—B which supports the inference is the same in kind, but in common usage it is ordinarily not until a class has been formed, well-defined or ill-defined, as the case may be, that the underlying connection is called a generalization.

False Analogy.—It has already appeared that the danger to which we are exposed in analogical reasoning is the danger of ignoring differences in the attendant circumstances. This is exactly the same danger as the one which we encountered in the study of universal connections. In reasoning from analogy,

**The Process of Argument*, p. 40.

however, we are not concerned to prove a universal connection, but to show that a given generalization applies to the case in hand; or, to state it differently, that a given resemblance justifies the inference which we make. The best that we can do under the conditions is to scrutinize the new context in which the point of resemblance A is found. If it turns out that there is an important point of difference, i.e., if the nature of the resemblance is different from what it was supposed to be, or if the generalization involves conditions which are absent in the new case, the argument is invalidated. If an analogy can be shown in this way to be unreliable, it is called a false analogy.

For a concrete instance of false analogy we may refer to the argument, just discussed, which compares colonies with corporations. As a second illustration we may take Carlyle's analogical argument against the representative form of government. According to Carlyle, this kind of government is bound to fail, since, as he puts it, a ship could never be taken around Cape Horn if the captain were obliged to consult the crew every time before changing his course. A generalization is implied, something like, 'The sharing of power involves a lack of efficiency.' Granted that this holds true on ships, is it also true in government? The argument asserts that the two cases are alike, but it offers no proof that the difference in circumstances is immaterial. The apparent difference, however, is so great that caution is advisable. It may be that the lack of efficiency is due to the sharing of power under certain conditions peculiar to the management of ships. It is impossible to prove that the connection between 'sharing of power'

and 'lack of efficiency' is universal, for the cases are not of such a kind that we can vary all the other circumstances, as the proof of a universal proposition requires.

If we examine Carlyle's argument more closely, we soon find that it rests upon a false analogy. Certain important differences are overlooked. In the first place, the authority shared by the people concerns the legislative rather than the executive branch of government. Hence popular government leaves the executive a free hand within the scope of the laws, just as the captain has a free hand within the scope of his instructions. And secondly, the relation of a crew to a ship is very different from that of a people to their government. With respect to this relation, a government is more nearly like a partnership, in which the sharing of authority is not necessarily incompatible with efficiency.

As a further illustration of analogical reasoning we may take the argument, ascribed to the Chinese, that a prince, since he is the father of his people, should have the same authority over his subjects that a father has over his children. The generalization here is that a 'father' should have autocratic power. This right is generally conceded to the parent, because affection for his children and superior wisdom are presupposed. If these conditions are absent, the extension of the generalization is unwarranted. With respect to these conditions, however, the two cases are widely different, and so the analogy has no value as a basis for this inference.

The Value of Analogy.—The correctness of analogical argument depends, as we have seen, upon the

essential similarity of all the relevant circumstances. Whether such a likeness exists can be determined only by an analysis of the new context, in order to ascertain whether it contains anything that must be considered. Until this has been done, logic can pass no judgment upon the reliability of the resemblance. It may be an important resemblance or it may not be. If an important difference is found, the resemblance, as has been shown, is worthless. If, however, a careful scrutiny of the new context reveals no circumstance which neutralizes the force of the analogy, the latter can claim a certain measure of probability; the degree of probability depending upon the extent to which it is possible to eliminate reasonable doubt.

This scrutiny, however, of the new context serves to make us understand better the nature of the resemblance in question. Thus it may bring to light further resemblances which point to the same conclusion. "In the argument from analogy we [may] put together a number of little points of likeness between case A and case B and (rightly or wrongly) judge the total likeness sufficient. The Panama Canal resembled the Suez Canal in various evident ways—amongst others in being schemed by M. de Lesseps; and, no doubt, among other bits of loose generalization that the unlucky investors put together was one to the effect that 'Whatever M. de Lesseps undertakes is likely to succeed.' " *

In general, then, it may be said that if an analogy can maintain itself against criticism, it establishes some measure of probability. This probability, however, cannot be stated in the satisfying form of per-

* Sidgwick, *The Process of Argument*, p. 45.

centages, since the probability is not determined by the study of a class, but by the examination of a particular resemblance. It should be noticed also that while the probability may be increased by the discovery of further resemblances, it comes short of certainty, so long as we have reason to think that all the relevant circumstances have not been taken into consideration. In the comparison of the Panama and Suez canals, we know that many important circumstances are bound to be overlooked. Here again resemblance gives us the clue. Even though we may not be well informed on the subject of canal building, it is like other large enterprises in that it involves many factors which cannot be determined in advance. The knowledge, therefore, that our analysis is not complete justifies or motivates a doubt, i.e., it establishes a certain measure of probability for an adverse conclusion. Hence we can at best only conclude that the inference is probably correct. A motivated doubt, as we are now able to define it, is *a doubt that can point to some fact which seems to establish an analogy or a general rule as a basis for the doubt*. Wherever a motivated doubt is still possible, we have not escaped from the region of probability. It is probability, whether the matter in hand concerns a universal connection, a causal connection, or a question of individual fact; and the probability is necessarily based either upon class resemblance or upon analogy.

The Relation of Analogy to Circumstantial Evidence.—According to the foregoing account, our natural tendency, in dealing with a new kind of case, is to look for resemblances between it and things with which we are already familiar. Such compari-

sons we usually call analogy. It may happen, however, that our inference involves a comparison with a number of different things. For example, in estimating the merits of a football team, we may compare it with several other teams, and our inference may thus be based upon a series of comparisons. One comparison may convince us that our team has an advantage in speed, another that it has an advantage in weight, a third that it has an advantage in superior training, and so on. From these comparisons, taken collectively, we may infer that our team is likely to win the championship. When inference is thus based upon a variety of different resemblances, i.e., when the evidence is thus pieced together from different sources, we tend to call it circumstantial evidence. In both analogy and circumstantial evidence we deal with cases which cannot be settled by reference to a class. The inferences are based upon resemblances, and each resemblance involves a 'rough' or 'loose' generalization. The distinguishing feature of analogy, as here defined, is that it draws its resemblances from the single parallel case or class of cases which is regarded as analogous; whereas in circumstantial evidence the resemblances are derived from various sources. It may be that no single case can be found which constitutes an exact parallel to the case under consideration.

Analogy, then, passes into circumstantial evidence if different analogies are combined to support a conclusion. This transition to circumstantial evidence may also be indicated if we approach the matter from the side of classification. It was stated above (p. 155) that estimates of probability are made more accurate by

subdivision of the class. This subdivision is accomplished by taking into consideration a greater number of circumstances or resemblances that point to the same conclusion. If, however, we continue to do this, our judgment of probability is, in the end, determined less by the behavior of the class than by the combination of resemblances. If we go far enough, the class is finally reduced to a single member, i.e., we rely no longer upon classification, but upon circumstantial evidence. We pass from the one to the other without a break. Circumstantial evidence, then, differs from simple classification only in the fact that the *combination* of resemblances is unique. In the trial of criminal cases, for example, it is not possible to decide a particular case by simply putting it under a general rule, but each case must be tried on its own merits, i.e., each case presents its own peculiar difference. The difference, however, may lie mainly in the combination of the circumstances. Taken separately, these circumstances may be very familiar to us; and if so, each one involves a simple classification.

Incidentally we may also note that these various familiar resemblances may be 'felt' before they are clearly defined. As was shown in the discussion of class names (*cf.* Chapter II), our feelings outrun our powers of analysis. "Saturated with experience of a particular class of materials, an expert intuitively knows whether a newly-reported fact is probable or not, whether a proposed hypothesis is worthless or the reverse. He instinctively knows that, in a novel case, this and not that will be the promising course of action. The well-known story of the old judge advising the new one never to give reasons for his

decisions, 'the decisions will probably be right, the reasons will surely be wrong,' illustrates this. The doctor will feel that the patient is doomed, the dentist will have a premonition that the tooth will break, though neither can articulate a reason for his foreboding. The reason lies imbedded, but not yet laid bare, in all the countless previous cases dimly suggested by the actual one, all calling up the same conclusion, which the adept thus finds himself swept on to, he knows not how or why.'* *

* James, *Psychology*, Vol. II., p. 365.

CHAPTER XII

CIRCUMSTANTIAL EVIDENCE AND THE TEST OF TRUTH

The Nature of Circumstantial Evidence.—The relation of circumstantial evidence to other forms of inference has already been indicated in the preceding chapter. If an inference relies upon a resemblance that is newly-seen, rare, or doubtful, it is called an inference from analogy; if it is made upon the basis of an established classification, it is called an inference from a generalization; if it involves a variety of resemblances so combined as to bear upon a single point, it is usually or frequently called an inference from circumstantial evidence. For our purposes, therefore, circumstantial evidence is sufficiently, though somewhat loosely, defined if we say that it is a *combination of resemblances*.

In ordinary usage the term circumstantial evidence is applied most frequently to a kind of evidence employed in the trial of criminals. For example, a house has been robbed during the night. Smith has been seen hanging around the place on the preceding day; some of the plunder is found in his possession; his boots fit the footprints under the window; and a glove that was dropped in the house is proved to belong to him. Although no one saw the act, evidence

of this sort may be strong enough to warrant a conviction. Each of the resemblances, if taken by itself, may create but a small presumption; together they may form a chain too strong to be broken. The man who loafs about a place is not necessarily the man who committed the crime; the man who has possession of the stolen property is not necessarily the thief; the man whose boots fit the footprints is not necessarily the man who made those footprints; and the man who owns the glove is not necessarily the man who dropped it where it was found. Frequently, indeed, this is the case; i.e., each detail involves a loose generalization. It may happen, however, that the different circumstances do not avail for the inference if taken separately, but only in conjunction with each other. Thus we may think nothing of the fact that a man supports his family on a scale of \$2,000 a year. Nor is the possession of an expensive automobile an indication of moral depravity. Nor again is a position in a bank at an annual salary of \$1,000, without any other visible means of support, in itself peculiarly striking and significant. If, however, these various circumstances happen to be combined in the same individual, the case is different. Collectively they may produce an impression which singly they do not even suggest, i.e., the circumstances constitute a resemblance only when in combination. Circumstantial evidence covers both kinds of cases. Our present task is to study this form of reasoning, in order to become acquainted with its methods and to bring to light the test of truth which it presupposes.

The nature of circumstantial evidence is best studied in connection with concrete arguments. The preced-

ing discussion has made it clear that the type of reasoning called circumstantial evidence is not confined to courtroom procedure. It is employed quite as extensively in debate, in scientific proof, and in everyday reasoning. As a matter of convenience, the examples to be employed will be taken from these other fields.

Examples: I. The first of our examples may be considered an illustration of the procedure commonly adopted in debate. Incidentally it also exemplifies the force of unanalyzed resemblance. The argument occurs in a magazine article entitled, 'Some Reasons why the American Republic may Endure.'* To the average American citizen, it seems safe to say, a parade of evidence on this point is not exactly the fulfilment of an urgent need. He is only too ready to take the whole matter for granted, and the less reflective he is, the more this is likely to be the case. In part this is doubtless due to the fact that the question was never really brought to his attention. But even if the fate of other republics is pointed out, he is inclined to look upon the present case as different. The American Republic is somehow so robust and big and solid that its destruction seems scarcely more than a remote possibility. The reasons, however, why its history should be different from that of other republics are not easily given; and even if some are offered, there is apt to be a feeling that they do not do justice to the facts. In a number of ways the American Republic suggests durability, but we may find it difficult to specify just what they are. The article mentioned aims to perform the necessary

* *Forum*, Vol. 18, pp. 129-145.

analysis by setting forth in detail the attributes of the American Republic which make for durability. A brief enumeration of the main reasons that are advanced will suffice for present purposes. They are: (1) Toleration in religion, which promotes mutual understanding and goodwill; (2) Universal education, which stimulates interest in public affairs; (3) Purer family life, which elevates the moral tone of a nation; (4) Greater concern for public happiness, as expressed in the maintenance of parks, museums, and other public institutions that tend to prevent public discontent; (5) Publicity, which makes wrongdoing more difficult; (6) Loftier ideals of individual worth and freedom.

The argument, it will be seen, does not rely upon any single resemblance, but upon a combination of resemblances. Each of these resemblances involves a generalization, such as, 'Toleration in religion makes for permanence,' 'Universal education makes for permanence,' etc. Each of these generalizations bears upon the same point. The probability, however, which each of these generalizations is able to create by itself is very slight, because the generalizations are true only in the abstract, or 'other things equal.' Hence we put together as many such generalizations as possible, in order to heighten the probability. Underlying the entire argument is a complex generalization to which we must look for justification of whatever degree of probability we may feel. This generalization is to the effect that 'Wherever conditions A, B, C, D, etc., are present, we may expect permanence.' The argument, therefore, may be stated in syllogistic form as follows:

Governments that have (1) Toleration in religion, (2) Universal education, etc., etc., are governments that are likely to endure;

This is a government that has (1) Toleration in religion, (2) Universal education; etc., etc.;

Therefore this government will endure.

Since our present business is with the combination of resemblances, the question for our special consideration, in connection with the present argument, is this: On what grounds are we entitled to assume that in all cases where the resemblances enumerated in the major premise are present collectively, we may assert 'permanence'? This major premise is a universal proposition; but it is evident that its truth cannot be proved by the method of varying all the irrelevant circumstances, i.e., by the Method of Agreement. The available cases are not sufficiently numerous to make this method applicable. For the same reason it is impossible to estimate the probability of this particular case in terms of ratios. We must, therefore, rely upon a different mode of proof.

The form of proof involved in this argument has already been indicated in the discussion of analogy. It was there pointed out that an analogy can claim a certain measure of probability, if a scrutiny of the surrounding circumstances fails to reveal any fact which upsets the claim, i.e., a fact which points to a different conclusion. If, therefore, we assume that the resemblances which we find in the present case all point to the same result, it may rightly be claimed that a preponderance of probability has been established. It is not claimed that the resemblances in question exclude all ground for doubt. We know too

well that the life of a nation is dependent, in a large measure, upon conditions which cannot possibly be predetermined. The analogy of other nations is a legitimate ground for doubt, and forbids complete confidence in the conclusion.

In this presentation it is assumed, for the sake of simplicity, that all the discoverable resemblances point the same way, and that the only warrant for doubt lies in the obvious incompleteness of our knowledge. Such simplification, however, is rarely warranted in serious matters. In subjects that are proper subjects for debate, some of the resemblances are found to point in one direction, while others point in another. It therefore becomes necessary to balance probabilities as best we can. This task is one for which logic can lay down no rules, since each case is unique. Logic can only insist (1) that every resemblance must be allowed to count as evidence, unless its force is neutralized by criticism; (2) that if all the discoverable resemblances give their support to our inference, we are justified in asserting that a preponderance of probability has been established; (3) if there is evidence on both sides, we must determine the preponderance of probability as well as we can, without the aid of any set rules. Whenever we are called upon to compare probabilities, personal idiosyncracies, and the perception of undefined resemblances are bound to play a part.

It must be added that while the truth of our conclusion is dependent upon the truth of our major premise, it is not customary, in the type of argument just considered, to single out the major premise so explicitly for special consideration. As a rule, at

least, the syllogistic form is not only awkward, but useless in circumstantial evidence, and is therefore left unexpressed. Since the major premise does not apply to a considerable number of cases—its application may, indeed, be limited to a single case—its truth is not usually known in advance. We cannot, therefore, appeal to the major premise in order to prove the present instance, but the premise itself must be proved by a consideration of the individual resemblances. In effect, therefore, we prove both the major premise and the individual instance by the same process, and consequently we gain nothing by distinguishing between the two and by reducing the argument to the form of a syllogism.

II. The mode of proof in the preceding argument is in principle the same as the one adopted in the arguments for the theory of evolution, although the two arguments differ greatly in strength. One of the commonest facts in everyday life is the influence of heredity. Now comparative anatomy shows a remarkable resemblance in the structure of animals as widely different from each other as the whale, the bat, the horse, and man. This resemblance suggests heredity or community of origin. The suggestion finds support in paleontology, or the study of fossils. It is found that if the remains of certain animals, notably those of the genus horse, are placed in a series corresponding to the temporal order in which the individual animals appeared upon the earth, the whole series of forms leads up, by successive steps, to the forms with which we are familiar to-day. Here again heredity is suggested. Moreover, if we trace back different lines of descent, we find that they

show a certain approximation to the same type of structure, which again points to evolution.

A further analogy is found in the facts of embryology. The embryo animal passes through a series of forms which correspond roughly to what other evidence, particularly paleontology, shows to have been the course of evolution. Apparently we have here a case of heredity. And, lastly, the geographical distribution of living beings looks like evolution. The number of new species, both of animals and of plants, that are found in a given territory, varies, in a general way, with the isolation of that territory. Far distant islands have an unusual number of distinct animals and plants. This suggests that the forms were originally alike, but that, being placed under different conditions, after they had in some way reached these isolated regions, they developed in different directions. In short, all the facts here mentioned go to prove evolution, because they seem to bear an essential resemblance to the facts of heredity.*

The facts just cited constitute resemblances in the sense that they are the kind of facts which we might expect to find if we should assume that evolution is true. They resemble the facts of heredity. This being the case, it is not strange that it should sometimes be possible to foretell the facts before they are found. If man descended from the lower animals, then, according to the laws of heredity, we are entitled to look, in man, for the traces of certain structures which were present in these lower animals.

* Cf. Romanes, *Darwin and After Darwin*, Vol. I., Chapters on Morphology, Embryology, Paleontology and Geographical Distribution.

Accordingly, "the prediction was hazarded, by an older comparative anatomy, that in the embryonic state, he [man] would be found with 13 or 14 [pairs of ribs]. This prophecy has since been verified. It was also predicted that at this early stage he would be found to possess the insignificant remnant of a very small bone in the wrist, the so-called *os centrale*, which must have existed in the adult condition of his extremely remote ancestors. This prediction has also been fulfilled."*

The facts thus predicted, it may be noticed, were not facts that were still to come into being in the future, but facts that were to be discovered in the future, although they had come into being in the past. Facts that are still to occur cannot be predicted with any great degree of certainty, unless the circumstances are relatively simple, so that the conditions are well known. Hence the prediction of facts that are still to happen is eminently successful only when the conditions are sufficiently under our control, as in scientific experiments. In other situations there is constant danger that the result will be modified by factors which cannot be foreseen. For this reason prophecy is shunned by the wise. Where prediction can be verified, it merely serves the purpose of directing our attention to further resemblances and is not a special form of proof. If only the resemblances that are necessary for proof come to hand and their significance is understood, it does not matter in the least whether they were predicted or discovered by accident.†

~~If we compare the arguments for evolution with the~~

* Drummond, *The Ascent of Man*, p. 96.

† That the ability to predict is not necessarily conclusive

If we compare the argument for evolution with the argument for the stability of the American Republic, we find that the one deals with the past while the other deals with the future. This alone is an important difference, because, as has just been indicated, the inference from cause to effect is hazardous, unless we are protected against the influence of causes which we are unable to foresee. But the inference from effect to cause is a different matter. In this latter case we have the great advantage that we need not consider any possible causes, except such as have left some record or imprint of their presence. To suggest such other causes would be unmotivated. Now, according to the advocates of evolution, the facts all point to origin by descent as their explanation, and, moreover, this is the only explanation which is specifically pointed out. If this is the case, it would plainly be unwarranted, or unmotivated, to treat all these resemblances as accidents, and their conjunction as a mere coincidence. In view of the number and variety of these resemblances, the probability that evidence appears when we consider the syllogism which it implies. Syllogistically the prediction cited above would read:

If evolution is a fact, the embryo possesses the characters *x*, *y*, *z*;
But the embryo does possess these characters;
Therefore evolution is a fact.

It is evident that this argument involves the fallacy of affirming the consequent. We do not have complete proof until we are able to convert the major premise and say, 'If the characters *x*, *y*, *z* are present, evolution is a fact.' This proposition, however, is uncertain, unless we find further resemblances which, collectively, are sufficient to exclude reasonable doubt. If, on the other hand, we avoid the syllogistic fallacy by adopting as our minor premise, 'But evolution is a fact,' it is evident that this premise assumes what is to be proved. The main service of prediction for proof is, therefore, to direct us in the finding of important resemblances.

they should merely happen to occur as they do, is reduced to a minimum. If the letters of the alphabet were combined at random, words might be formed occasionally, but to suppose that a Shakespearean play could be formed in this way, would hardly be an admissible hypothesis.

III. In both of the above arguments the inference is founded upon a number of resemblances, each of which pointed to the conclusion. It may happen, however, that some of the resemblances serve mainly to suggest some other resemblance, which, if it can be found, will bear the main burden of the proof. An example of this is Franklin's proof that lightning is electricity. This view commended itself to him at the outset on account of the numerous resemblances between the two. "Lightning travels in a zig-zag line, said he, and so does an electric spark; electricity sets things on fire, so does lightning; electricity melts metals, so does lightning. Animals can be killed by both, and both cause blindness; electricity always finds its way along the best conductor, or the substance which carries it most easily, so does lightning; pointed bodies attract the electric spark, and in the same way lightning strikes spires and trees and mountain tops. Is it not most likely that lightning is nothing more than electricity passing from one cloud to another just as an electric spark passes from one substance to another?"*

This array of resemblances raised a considerable presumption in favor of the view advocated by Franklin. The main proof, however, was furnished by his famous kite experiment. If lightning is electricity,

* Buckley, *A Short History of Natural Science*, pp. 256-7.

it must be possible, with the proper equipment, to draw this electricity to the earth. Hence the kite was sent up during a thunderstorm, and a connection was thus established between the clouds and the earth. To the end of the string by which the kite was held there was tied a metal key. The string was then lengthened with some silk. Since silk is a bad conductor, the electricity would be collected in the key, instead of escaping through the hand that held the silk. It was then found that if the key was touched with the finger, the usual effects of contact with electricity resulted, including the characteristic spark.

The supposition that the clouds were charged with electricity was proved by this experiment, in the sense that the clouds were found to act as if charged with electricity. The evidence here, as in the preceding illustrations, rests upon resemblance. The present case differs, however, in that one of the resemblances is so obviously more significant than the others. It is clear, therefore, that proof is not altogether a matter of number of resemblances, nor of their conjunction, but that the character of the resemblance may be of much greater consequence. Under certain conditions the presence of electricity in a body means that the electricity has been transmitted from another body. This rule having been found true in a wide variety of laboratory experiments, such transmission must be assumed in the present case, unless it is possible to point out an important difference in the conditions. The other resemblances are merely supplementary evidence. The peculiar lurid color, for instance, which is common to both lightning and electricity, is able to raise but a slight presumption,

for while sameness of color may mean identity of kind, it more frequently does not.

In so far as this argument is based upon an underlying generalization that is applicable to a wide class of (laboratory) cases, it may be classified as an inference from a generalization. But since the main problem is to determine whether the resemblance of conditions is trustworthy, i.e., since the resemblance is doubtful, the inference seems to be, on the whole, more closely allied to analogy or circumstantial evidence. We might justifiably classify it as analogy, since the inference is based upon resemblance to a class of cases. This resemblance, however, is fairly complex, and in the process of proof we bring the new fact into relation with a wide set of other facts besides those of electricity. The proof, therefore, involves a combination of resemblances; and our whole procedure is, so far forth, akin to circumstantial evidence. The example shows concretely how closely these different forms of inference are related to each other. At their extremes they are readily distinguishable, but the classification of border-line cases is a matter of individual preference.

The Test of Truth.—From the arguments just discussed it is plain that evidence or proof admits of many degrees. Some inferences are extremely probable, while others are not. We must now inquire more closely than we have hitherto done, what standard or test we employ in distinguishing between the true and the false.

We may begin by reminding ourselves that when we attempt to establish a connection between A and B, it is never possible to vary all the circumstances

but one, in order to prove that the connection is universal; nor can we vary one and only one circumstance, in order to prove a causal connection (*cf.* Chapters IX and X). To prove that the cause which makes the phosphorus of a match give off light and heat is the friction of striking, we should not find it either possible or necessary to show that the friction is the only circumstance which has varied. It may be that some other circumstance occurred at the same time, such as the eruption of a volcano on a distant island, or a street fight in the next block. What we actually try to do is to vary those circumstances, one by one, about which we are in doubt, paying no attention to the rest. Essentially the same procedure is followed when we try to prove that a connection is universal. In order to show that all unsupported bodies fall, we do not attempt to vary all the possible colors, shapes, and sizes of objects, nor do we attempt to vary circumstances such as the immigration laws, or a revolution in South America. Circumstances of this kind are set aside before our inquiry begins, because we approach our problem with a definite body of information as to the constitution of things.

We find, therefore, that previous experience narrows the range of our investigation enormously. The term experience is here used in its widest sense, as inclusive of all the information at our disposal. But neither is this previous experience attested by a rigorous application of the respective Methods; and the question therefore arises how knowledge gets a start.

The answer to this question is not difficult, if we remember that we are born with the tendency to make generalizations. If A and B are perceived to

occur simultaneously or in immediate succession, we tend to assume a connection. If the connection seems to hold good throughout a great variety of facts, our conviction of its genuineness becomes strengthened. That heat, for example, expands bodies and that cold contracts them, accords with a great many diverse observations, such as the lengthening of steel rails in the summer, the ascension of smoke, the existence of trade winds and ocean currents, the changes in the density of water, etc. And at the same time we learn that many conjunctions are merely accidental. If we assume that heat affects the volume of bodies, we cannot at the same time attribute the change in volume to the noises of the street or to nihilistic activities in Russia.

The fact that we approach each new situation on the basis of previous experience carries with it an important implication. It was stated that previous experience serves to narrow down the range of our investigation. The connection which we seek must be found within a relatively small area, and it is only within this area that we attempt to vary all the circumstances, or a single circumstance, as the case may be. We must now note that when the connection is discovered of which we were in search, we incidentally furnish a bit of evidence to prove that our preliminary assumptions were correct, since we have widened the sphere within which these assumptions have been found reliable. On the one hand, a general background of information is necessary in order to enable us to discriminate between connections that are necessary and connections that are accidental, and thus to make possible the inference, on the present

occasion, that A and B are connected; and on the other hand, the new inference, in its turn, justifies the conclusions reached in previous experience. The experiment with the match, for example, strengthens our supposition, both that friction may cause fire, and that distant street brawls and volcanic disturbances are confined to the general type of effects previously ascribed to them.

It seems evident, therefore, that the proof upon which we rely is not the rigorous application of the Methods, but the harmony of the present experience with a large body of previous experience. The previous experience determines the area within which the Methods are to be applied. In order to criticize the inference that A and B are connected, it is not sufficient to show a lack of conformity to an abstract ideal of proof, for the same charge might be brought against the whole of our experience. In order to justify the doubt, we must point out some specific fact which, according to previous experience, justifies the doubt. As was stated before, a doubt is unmotivated, unless it can point to some fact which seems to establish an analogy or a general rule as a basis for the doubt.

If we turn now to circumstantial evidence, we find that it relies upon the same test of truth. The guiding principle is resemblance, which means that we attempt to harmonize the new fact with our other experiences. We have seen how analogy grows into circumstantial evidence by the combining or piecing together of resemblances, and how the probability tends to increase as the process continues. The greater the number of resemblances which are thus discovered, the more com-

plete is the assimilation of the new fact with previous experience. The new fact may thus constitute the focus of a complex network of relations, like the center of a spider's web. We may find that we cannot doubt the new fact without casting a doubt upon other experiences which were supposed to be trustworthy. Thus we find that if we doubt whether lightning is electricity, we are entertaining a doubt which can easily be extended to the methods employed by the scientist in the laboratory, when he is engaged in the study of electricity. Circumstantial evidence, therefore, derives its strength from the support of the great mass of other experiences to which the new fact is assimilated, and it rightfully denies a hearing to all doubt, except the motivated kind.*

It is plain, then, that the test of truth upon which we rely in all these forms of inference is the convergence of evidence. When a vast body of facts converges upon a single point in such a way that no room remains for a motivated or reasonable doubt, we possess the best evidence that it is possible to obtain. The previous knowledge then guarantees to us the correctness of the new inference, and the latter on its part proves the trustworthiness of the former knowledge. A doubt of the one then involves a doubt of the other. Taken in relative isolation, an inference may be criticized with ease, but when taken in connection with other inferences, it may be invincible; and the political motto, 'United we stand, divided we fall,' has, therefore, a peculiar appropriateness as applied to inferences.

* For an illustration of convergent evidence cf. Tyndall, *The Forms of Water*, §§ 1-8; also *Atlantic Monthly*, Vol. 90, p. 433, Article, "A Study of Local Option."

If, however, the support of previous experience is necessary to guarantee our new inference, the question naturally suggests itself, how it is ever possible to prove that previous experience is wrong. The belief that heavy bodies fall fastest was supported by a great and varied amount of evidence, and yet it has been proved to be false, for experiment shows that in a vacuum all bodies fall at the same rate.* Likewise the belief that the earth is necessarily flat was found to be untenable when new facts were discovered. In these cases, it would seem, the new facts were established not by means of old facts, but in spite of them.

The difficulty here involved is more apparent than real. While the experiment with the vacuum overthrows the old belief as to heavy bodies, it also shows that the belief contains a certain amount of truth. The experiment shows that heavy bodies do fall fastest *in a resisting medium*, i.e., when air is present. The behavior of bodies in a vacuum simply calls our attention to a circumstance which was previously overlooked. If we take account of this circumstance, the old fact and the new fact are in accord with each other. In a similar manner the Newtonian theory of gravitation simply brings out a circumstance which the older view had failed to consider. It is true that an object will ordinarily fall off the lower surface of a sphere, but only on condition that some larger body is near to attract it. By 'lower side' we mean merely the side which is nearest this larger body. When this condition is duly recognized, the facts no longer conflict, but support each other. The older

* Cf. Hobhouse, *The Theory of Knowledge*, pp. 405-6.

beliefs, therefore, are not wholly devoid of truth, but rather require reinterpretation. In general it may be said that the complete refutation of an erroneous belief always explains how this belief came to be entertained. Such refutation, therefore, not only casts out the erroneous belief, but in some way or other uses it to confirm the organized body of our experience.

Competing Explanations.—It frequently happens that a fact may be explained in more than one way. If the two explanations cover the situation equally well, but differ in simplicity, we adopt the one which is the simpler. The other one is then rejected for either of two reasons: (a) because it resorts to purely imaginary causes, when there are known causes at hand, which are able to account for the whole fact; or (b) because it assumes a special combination of circumstances, where a simpler explanation is equally satisfactory.

By a 'purely imaginary' cause is meant a cause for which there is no specific evidence. The suggestion that the planets are held in their courses, not by the mutual attraction of matter, but by invisible beings who pull them about in a manner which happens to accord with a universal law, illustrates the kind of explanation which makes appeal to imaginary causes. If this kind of explanation is to receive serious consideration, the door is opened to all kinds of absurdities. Considered merely as an abstract possibility, the relation between volition and movement may be a mere coincidence. It may be that whenever we desired in the past to move an arm or hand, some cause, which was quite unrelated to our desire happened to produce just that movement at just that time.

To assume a special combination of circumstances where a simpler explanation is equally adequate is in principle about as objectionable as to assume imaginary causes, since such assumption also lends itself readily to abuse. This can be shown most clearly where the fact to be explained occurs with some frequency. If past experience is to be our guide, we must assume that "if a given result involves a complex combination of many antecedents, it will be rare. And conversely, if a given 'casual' combination is frequent in a given area, it is more probably due to a 'single' cause . . . than to a combination of causes. Thus the recurrence of a particular hand at whist is vastly improbable, owing to the great complexity of the circumstances which produce it. And conversely, should it recur, it is a lamentable, but probable inference, that a single human agency has produced it in both instances. It would require a very complex combination of undirected bumpings and rubbings to shape one piece of flint into an arrow-head, so that arrow-head flints so formed would be rare. And conversely, if many are found together, the probabilities are great that all the rubbings and bumpings that produced them were due to a single connected cause."*

The reason why it is not permissible to make use of imaginary causes or of causes which are unnecessarily complex will be readily perceived. To use such causes for explanation is to violate the principle that all doubt must be motivated. If we set aside the evidence for known causes, in favor of causes for which there is no specific evidence, we arbitrarily

* Hobhouse, *The Theory of Knowledge*, p. 311.

cast a doubt upon the evidence that is at hand. If the evidence tends to show that the power which controls the movements of the planets is the same as the power which causes bodies to fall, this evidence cannot be rejected unless there is sufficient evidence on the other side. Similarly, the evidence of some causal connection between volition and movement is of the same kind as that of any other causal connection, and, therefore, cannot be ignored, unless we are prepared to discredit other inferences as well. And in the same way, we challenge the authority of previous experience, if we insist upon a more complex explanation where a simple one is equally sufficient.*

In deciding between competing explanations, it must be remembered that the simpler is preferable only if it is equally competent to do justice to all the facts in the case. Descartes' theory that all animals except man are merely cunningly contrived machines, without any consciousness, is simpler than the common view, but it disregards the resemblance between animal behavior and human actions. Again it may

* The principle that doubt must be motivated is sometimes known as the Law of Parsimony, which declares that "we must not assume the existence of more things than necessary." This law or rule was formulated by a Franciscan monk, William of Occam, who died in 1347; and it is sometimes called Occam's Razor, because it cuts away explanations which lack proper motivation. Occam's formulation was: *Entia non sunt multiplicanda praeter necessitatem*. By Occam the law was given a more special application, but if we give it full scope, it takes in all cases of unmotivated doubt. For an interesting application of the law of parsimony cf. LeConte, *Elements of Geology*, Chapter III., p. 109 (4th edition), in the paragraph entitled "Theories of Geyser-eruption." Compare Mackenzie's theory with the theory advanced by Bunsen and now commonly adopted.

be simpler to assume that a suspected person is guilty of a crime than that the appearance of guilt is due to a fortuitous combination of circumstances; but the suspicion may be completely at variance with what we know about the person's character. Situations constantly arise in which it is impossible to determine in any off-hand way, or according to any set rule, the preponderance of probability, and doubt is, therefore, justifiable.

The Function of Reasonable Doubt.—Whenever a reasonable doubt is possible, the evidence is not yet sufficient. At that particular point where the doubt finds a foothold, experience does not seem to support our theory. We may thus be uncertain as to the identity of lightning and electricity, because in spite of numerous resemblances, the electricity of the laboratory involves visible and tangible objects, whereas lightning does not. The doubt, therefore, shows us where the argument is incomplete; and the removal of the doubt means that the case under consideration has been brought into relation with a wider range of facts. Thus the absence of visible and tangible objects loses its significance when it is found that air-currents can produce friction, and that the invisible particles of moisture can carry electricity. This means, of course, that a new set of facts has come into play, or that more evidence has been made to converge upon a given point. The case under consideration has been found to harmonize with a larger part of our total experience and has gained a corresponding increase in probability.

Probability and Certainty.—The limit of this process is reached, as has already been indicated, when

motivated doubt is no longer possible. This is the stage of practical certainty. The distinction between probability and certainty is one that is recognized in everyday life. It is not regarded as merely probable that heat expands bodies or that lightning is electricity. It is called practical certainty, because it is secure against all doubt, except the kind that is unmotivated. The weakest form of probability is thus connected by a continuous line with the point of certainty, where further evidence is no longer required. Certainty is approximated as the evidence becomes more convergent. In proportion as a belief stands isolated from other beliefs, it is called a blind belief or a superstition; whereas a belief that possesses evidence is called to that extent a rational belief.

The kind of certainty here discussed finds an interesting exemplification in courtroom procedure. The following passage from the instructions of a judge to a jury indicates plainly the criterion of truth that is meant to be adopted: "As to the distinction between reasonable doubt and a possible doubt, you were thoroughly examined when you were about to become jurors. The law does not require that the prosecution shall efface every possible doubt. It only requires that the prosecution shall go beyond a reasonable doubt. . . . The defendant is entitled to have his guilt established by competent evidence and beyond reasonable doubt. It need not be established beyond all doubt, for that is an impossibility. Nothing in this world is beyond all doubt. The defendant is entitled to every reasonable doubt and that is all.

"A reasonable doubt is such a doubt as might

arise in the mind of an intelligent man, who if called upon to give a reason for such a doubt would not be at a loss to do so. A reasonable doubt is not an imaginary thing. It is such a doubt as arises from the evidence. It is such a doubt as a painstaking man might have after a full, fair, and impartial weighing of the evidence. To all such doubts the defendant is entitled.

“ If any of you have a reasonable doubt that this defendant is guilty of murder in the first degree, but have no doubt that he is guilty of murder in the second degree, you may find in the second degree, and so with manslaughter.”

Hypothesis, Theory, and Fact.—It has been shown that all degrees of probability may be realized between the two extremes of unmotivated possibility and practical certainty. But although there are no hard and fast lines of division, language recognizes certain stages, just as we recognize in the life of the individual the stages of youth, maturity, and old age. These different stages of evidence are indicated, though in a rather haphazard fashion, by the terms hypothesis, theory, and fact.

By ~~hypothesis is usually meant a supposition that~~ has relatively little evidence to support it. Hypotheses are suggested by resemblances and are tentative explanations. The supposition, for example, that all the matter in the universe once existed in a gaseous state, is frequently called the Nebular Hypothesis. For the same reason a supposition which is made in order to make a prediction, may be referred to as a hypothesis, so long as the prediction remains unverified. Thus Franklin adopted the hypothesis that

lightning is electricity, and then proceeded to make a deduction from this hypothesis, in accordance with the principles which are formulated in the doctrine of the syllogism. Stated syllogistically, his reasoning was as follows:

Electricity behaves in a certain way (x) under certain conditions (y);

Lightning is electricity;

Therefore lightning will behave in this way under these conditions.

When the evidence in support of a supposition is relatively strong, we are more inclined to dignify the supposition with the name of theory. A hypothesis, therefore, may become a theory, if the predictions based upon it are verified,* or if sufficient evidence is secured in other ways. Thus the supposition that man and other animals have sprung from the same source is usually called the theory of evolution. The terms hypothesis and theory are, however, used loosely and are frequently interchanged.

When we speak of fact we generally mean anything which, for the purpose that we have in view, requires no proof. It marks the stage of practical certainty; and the possibility of error, which is suggested by terms like 'hypothesis' and 'theory,' is supposed to be absent. Thus we say that it is a fact and not 'merely' a theory that Washington was

* If a hypothesis is untenable, this may sometimes be made evident by showing that deductions made from it do not tally with the facts. Such refutation is sometimes known as *reductio ad absurdum*. An illustration is furnished in Webster's Reply to Hayne.

the first President or that bullet wounds may cause death.

The Fallacies of Circumstantial Evidence.—We have seen that circumstantial evidence is in principle the same as reasoning from analogy or from a generalization, the difference being, in the main, a difference of complexity. It is to be expected, therefore, that the fallacies with which we have already become familiar should recur in connection with circumstantial evidence. If we criticize circumstantial evidence in detail, we may find, now a false analogy, now a false assumption, now a false disjunction, and so on. Each successive criticism weakens the argument by so much. There is, however, in circumstantial evidence a frequent fault which, while it may sometimes be classed as a false assumption, usually goes by no commonly accepted name. It consists in the neglect of some important aspect or circumstance which, if given proper weight, would cast a doubt upon the conclusion. The argument then rests upon a false assumption, since it takes for granted that all the important considerations have been taken into account. The charge of false assumption, however, is not made, because by false assumption we ordinarily mean that the truth of some specific and questionable proposition has been taken for granted, whereas in this case the assumption is less specific. We simply take for granted, erroneously, that all the relevant circumstances have been considered. We may call this fallacy the fallacy of neglected aspect, although the term is inconveniently wide. The several circumstances upon which the inference is based do not point to the conclusion that is drawn, unless the

neglected aspect—the aspect which points to a different conclusion—is kept out of sight. We therefore say that the argument is ‘true in the abstract,’ or ‘true as far as it goes,’ but that it does not take things as they actually are. Hence the misleading saying has arisen, ‘true in theory, but false in practice.’ This saying is misleading, because a theory which cannot stand the test of facts is a false theory, since it distorts the situation. It assumes that the facts with which it deals have a certain constitution which in reality they do not possess.

As an illustration, we may take this newspaper argument against prohibition: “You destroy the jobs of people upon whom about 5,000 of the population depend; you take the jobs away from about 2,000 room-rent or house-rent payers or home owners; you deprive the city itself of about \$300,000 of direct revenue, in the way of excise taxes and property taxes; you depreciate the rental value of about \$5,000,000 worth of property in the town.”

We may assume that the assertions just quoted are entirely correct. If the facts which they bring forward were the only ones to be considered, the inference as to prohibition would be inevitable. If, however, the liquor traffic is as pernicious in its influence as its opponents claim it to be, the benefits which result from it are far outweighed by the evil which it produces. This aspect of the case is neglected, however, and so the argument remains inconclusive.

Persons who are visionary or ‘merely theoretical’

are particularly liable to the fallacy of neglected aspect. Their opinions may have a certain superficial plausibility or consistency, but we usually find that this is due to the fact that some important detail or details have been left out of account. Thus "every roseate picture of the happiness to be attained when the competition of commercial rivals has ceased, and the State controls all industry and gives every one his due, is painted in happy forgetfulness of the natural discontent, selfishness, or ambition which would prompt most of the people in such a community to shirk their appointed tasks, to use personal influence in order to get some special privilege, or to gain control of the machinery of government for the particular benefit of themselves and their friends—forces in human nature which would replace commercial competition with political jobbery."*

* Aikins, *Principles of Logic*, p. 211.

CHAPTER XIII

OBSERVATION AND MEMORY

We have seen that the final test of truth is the mutual support which different inferences give to each other. If a generalization is found to hold in a great number of different applications, or if a number of generalizations or analogies all point to the same result, we consider ourselves on the road to certainty; and when we reach the point where 'reasonable' doubt is excluded, the goal has been reached. What was at first merely a tentative hypothesis or a plausible theory, then becomes an indisputable fact.

In this scheme facts appear as the culmination of an elaborate process; and this circumstance is apt to raise a difficulty. It is well enough to reach facts as the result of our endeavors, but it would seem that facts are indispensable as a starting-point. Inference asserts that something is true because something else is true, as when we say that A is B and therefore it is C. The inference, however, has no great value unless we know at the outset that A is B. The apparent paradox, then, is that in order to have facts we must depend upon inference, while inference in turn rests upon facts.

The Popular Notion of Observation.—It is frequently supposed that the facts from which infer-

ence starts are not dependent upon inference, but given in a very different way. They are derived, not through the inferential processes underlying the convergent lines of evidence, but from the 'evidence of the senses.' Knowledge starts with what we immediately experience, and what we thus experience is fact. The basis of fact thus acquired through sense-impressions, known collectively as observation, furnish us with the material for the various forms of inference already discussed.

Difficulties of This View.—This view is, in a way, both simple and plausible. It holds that facts are of two kinds, those known immediately and those established by the convergence of evidence. Difficulties appear, however, when we examine the matter more closely. It is soon found that the term 'observation,' which is meant to refer to facts that are known immediately, is used in a very loose sense. It is applied to many facts which are not independent of inference. We 'observe,' for example, that a man is angry, or asleep, or proud, or indifferent. But what we actually see is, at best, certain facial expressions and bodily attitudes. Again, we say that we observe the presence of our friend or of certain familiar objects, whereas the phenomena of dreams and hallucinations show that such observations may be erroneous. Or we assert that we have observed the course of certain stars, the results of tariff legislation, of religious intolerance, etc. Here the element of inference is even more prominent. We do not observe the course of the star, strictly speaking; but we note certain positions and we infer that the star has moved along a continuous line from one of these

positions to the other. As to the tariff legislation and the policy of religious intolerance, we have noticed certain sequences and we have inferred a causal connection. Common sense itself tends to correct its loose usage of the term observation. When we make errors we do not usually say that we observed incorrectly, but that we 'thought we saw.' It is the thought element or the element of inference that gets the blame.

This indiscriminate use of the term, however, does not prove that observation in the narrower sense does not give us facts immediately and just as they are. It merely suggests that there may be difficulty in finding out what is pure sense-experience and what is not. But granted that there is pure sense-experience, the belief in its trustworthiness is apt to weaken when we study the processes which such experience involves. Psychology tells us that sense-experience is due in part to the stimulation of the sense-organs and in part to processes of association. A cake of ice, for example, looks cold; the eye of a snake looks cruel; and a block of granite may look hard or heavy. In each case the object 'looks' as it does owing to associations. Cold is not something that can be seen, since it has neither color nor form, yet the quality of the visual perception has been changed through the experiences that have been associated with this perception in the past. It is true that such associations usually suggest inference as well, but the point to be noted just at present is that the associations change the actual quality of the sense-perception, whatever else they may involve in the way of inference.

We find, then, that the total observation, apart from the element of inference, is a compound of sense-impressions and images. The images are copies of previous sense-impressions and they blend into the body of the total experience in such a way as to change the character of the sense-impression. This is why the ice looks so cold and repellent, whereas a bale of cotton looks soft, downy, and inviting. The images lose their individuality and become part of the bone and tissue of the total experience.

“ Our own language would sound very different to us if we heard it without understanding, as we hear a foreign tongue. Rises and falls of the voice, odd sibilants and other consonants, would fall on our ear in a way of which we can now form no notion. Frenchmen say that English sounds to them like the *gazouillement des oiseaux*—an impression which it certainly makes on no native ear. Many of us English would describe the sound of Russian in similar terms. All of us are conscious of the strong inflections of voice, the explosives and gutturals of German speech in a way in which no German can be conscious of them.

“ This is probably the reason why, if we look at an isolated printed word and repeat it long enough, it ends by assuming an entirely unnatural aspect. Let the reader try this with any word on this page. He will soon begin to wonder if it can possibly be the word he has been using all his life with that meaning. It stares at him from the paper like a glass eye, with no speculation in it. Its body is indeed there, but its soul has fled. It is reduced, by this new way of attending to it, to its sensational

nudity. We never before attended to it in this way, but habitually got it clad with its meaning the moment we caught sight of it, and rapidly passed from it to other words of the phrase. We apprehended it, in short, with a cloud of associates, and thus perceiving it, we felt it quite otherwise than we feel it now, divested and alone."*

This being the case, the question whether observation in its narrower sense is always reliable, becomes dependent upon the question whether the right associates always come up to blend with what is given in sense-impression. Evidently this is not the case. Sometimes it happens that different sets of associations come up in succession, so that the object changes before our very eyes, as when an object that we take to be a man is suddenly seen as a shrub or a post. However erroneous our perception, the object may be seen as distinctly as though it were present. We do not merely 'think we see' it, but we actually do see it; and this is as true of the other senses as of the sense of vision.

What is actually given in sense-impression is frequently but a small fraction of the whole; as it has been put, most of the seeing is done 'behind the eye.' We run our eye over a line of print and recognize the various words, not because we pay attention to each letter, as we might do if we were just learning to read, but because the casual glance is enough to arouse the associations which complete the picture. If it were not for the associations, we should be obliged to distinguish carefully between letters like b and h, or m and n, or p and q. But by means of

* James, *Psychology*, Vol. II., pp. 80-81.

associations, the details are filled in as they should be. For this reason we tend to overlook misprints. By association the correct letter is put in, so that we actually see what is not there.

The effect of association upon perception is shown in a striking way by the discrepancies in courtroom testimony. "In some Bowery wrangle, one witness was quite certain a rowdy had taken a beer-mug and kept it in his fist while he beat with it the skull of his comrade; while others saw that the two were separated by a long table, and that the assailant used the mug as a missile, throwing it a distance of six or eight feet. In another trial, one witness noticed at the seashore in moonlight a woman with a child, while another witness was not less sure that it was a man with a dog. And only recently passengers in a train which passed a courtyard were sure, and swore, that they had taken in at a glance the distinct picture of a man whipping a child; one swore that he had a clean-shaven face, a hat, and was standing, while another swore that he had a full beard, no hat, and was sitting on a bench. The other day two most reliable expert shorthand writers felt sure that they heard the utterances which they wrote down, and yet the records differed widely in important points." *

How Association is Determined.—The discussion of the principles which control association must be left to psychology. In general, however, we may say that by association we tend to see things as we have seen them before. But this is not the whole story. If we happen to be expecting something, we are apt to see it, i.e., the corresponding associations are

* Münsterberg, *On the Witness Stand*, pp. 16-17.

likely to come up, even if they are not the usual ones. Whether these two principles of association are the only ones we need not attempt to decide. Association is primarily a question of brain activity; and it may be that at times one set of associates comes up more readily than another, not because it is the most usual set, nor yet because we are expecting a certain object, but simply because the matter is determined by the physical condition of the brain, such as its state of nutrition or exhaustion.

Memory.—With regard to memory the situation is much the same. As in observation, associations inevitably come up which so modify the total experience that it is impossible to distinguish the elements and to point out just what it is that we remember and what it is that has been added or changed by association. The elements are not present in mere juxtaposition, but, like chemical elements, have united to form a new whole in which the constituents are lost to view. Correct observations, therefore, may be incorrectly reported by memory, and incorrect observations are subject to a further process of distortion.

“ A classic instance, both of the defects of our memory and of its general subjection to the law of assimilation, is furnished by the well-known accounts which older people are accustomed to give of what they frequently describe as the ‘ old-fashioned winters ’ of their childhood. ‘ The winters,’ so such a person may say, ‘ are no longer such as they used to be when I was a boy. At that time the snow began to fall in November, and lay almost steadily until March. We had sleighing nearly all the time,

and especially at Christmas. The harbor used to freeze over. The skating was almost steadily good. But nowadays the winters are full of unsteady weather: there are frequent thaws; the sleighing and skating are in no wise trustworthy; the harbor almost never freezes; in fine, the climate has changed.'

"That such reports are in general not confirmed by meteorological records, may and usually does seem of little importance to the reporters of such reminiscences. His memory is his own. Facts are facts; and meteorological science, he tells you, is notoriously uncertain. He prefers to trust his memory, which is perfectly clear on the subject. Now what most persons fail to notice is that the 'old-fashioned winter' of such reminiscences is, on its very face, a psychological and not a meteorological phenomenon. The human memory is essentially incapable of retaining a series of accurate reports of phenomena so variable and inconstant as those of the weather. In such a field only general characteristics can be remembered, especially after many years. How good an account can you now give, from memory, of the precise weather changes of even the past month? But even general characteristics are themselves not accurately recorded by memory, in case of the weather, as they were presented in fact; since we have no cerebral habits that are capable accurately of representing either mean temperatures, or amounts of snow fall, so long as precise records of these phenomena are not kept at the time. On the contrary, what we retain in mind, especially from our early youth, *are the memories of the more interesting and significant habits that winter weather formerly developed in us.*

In our memories the images that survive are, for the most part, assimilated by those which, when we recall the past, are directly connected with our more vividly recalled habits. As the youth formed his most important winter habits in connection with great snowstorms and decidedly cold weather, and as such phenomena occurred sometimes early and sometimes late in winter, and were of special importance to him in holiday season, his memories were formed accordingly. What the old man recalls is therefore a general collection of interesting winter habits, and of images clustered about them. These habits define for his consciousness a certain typical object, the 'old-fashioned winter,' which presumably never existed as he remembers it. The dreary individual detail of the actual winters of his boyhood has happily escaped his memory. But since lately, say in the present winter, he has such dreary details forced upon his present attention by uncomfortable experiences, he does indeed recognize that there is a present state of facts which he cannot assimilate to his memories of the 'old-fashioned winter' in question. He immediately concludes that the climate is changing or has changed. Similar processes occur in all cases where the 'The good old times,' the 'young people as they once were,' and other facts of the past, are praised on the basis of established memory habits." *

In much the same way a person who writes his autobiography is apt to distort the facts. He does not remember everything, and he has unintentionally accustomed himself to think of his conduct and of his motives in a certain stereotyped way. He has de-

* Royce, *Outlines of Psychology*, pp. 239-241.

veloped a certain habit or attitude, and this habit is pretty sure to be more complimentary to the normal individual than is warranted by the facts. The reason is that we instinctively shrink from those recollections which are discreditable in any way to ourselves. Consequently we are more upright and noble and admirable to ourselves than to any one else; and to see ourselves as others see us, is a gift which some power other than ourselves must give us, if we are to possess it at all.

The principle is readily applied in other directions. To a person who is credulous in regard to supernatural powers, the habits of mind that he gradually acquires tend to color his past experiences so as to make them seem totally different from what they actually were. Imaginary experiences are probably first suggested and finally become incorporated. "It happened once to the writer to hear a most scrupulously conscientious friend narrate an incident of table-turning, to which she appended an assurance that *the table rapped when nobody was within a yard of it*. The writer being confounded by this latter fact, the lady, though fully satisfied of the accuracy of her statement, promised to look at a note she had made ten years previously of the transaction. The note was examined, and was found to contain the distinct statement that the table rapped when *the hands of six persons rested on it!* The lady's memory as to all other points proved to be strictly correct; and in this point she had erred in entire good faith."*

It seems likely that in this instance the rapping of

* Quoted by Carpenter, *Mental Physiology*, p. 457.

the table was habitually regarded as an event outside the domain of natural law. This being the most interesting feature of the situation, the fact that the hands were on the table would naturally be ignored, since it tends to detract from the appearance of mystery. In the end the occurrence would then be remembered without these details, and be misrepresented in the way just described.

The Problem Involved.—As previously indicated, the recognition that observation and memory are subject to error seems to make inference impossible. As long as we assume that our data are absolutely reliable, we have solid ground upon which to stand. But if the data furnished through observation and memory are not reliable, what matters it that our inferences about these data are drawn in accordance with logical requirements? Incorrect premises may give correct conclusions, but if they do, it is a matter of mere chance. Since it must be admitted that the contents of observation and memory are largely constructions of our own, how are we ever to find out whether these constructions are correct or not? If we appeal from one sense-experience to other sense-experiences, we seem to overlook the fact that these other sense-experiences are themselves in need of verification. Every experience points beyond itself for its proof. No experience is able to guarantee its own truth absolutely. We wish to find something that is indubitably true, in order that we may have a starting-point for inference. But each experience declares its own insufficiency; and our quest becomes like that of the child which set out to find the pot of gold at the foot of the rainbow.

The Solution of the Problem.—The problem, how inference gets a start, which may appear so puzzling to reflection, is one that does not even exist for unreflective thinking and acting. Practical life spends no time in trying to unravel the knot, but cuts it through, without even realizing that the knot was there to be cut. It does not attempt to argue and prove; it simply takes for granted. The solid foundation which we seek as a basis for inference is acquired, not by demonstration, but by assumption. The question how a stable basis for inference is to be found, suggests an order of procedure which is the reverse of the truth. We do not begin life in an attitude of scepticism, demanding proof for everything before we accord to it our assent or belief. If we did, intellectual paralysis would be the inevitable result. On the contrary, our natural tendency is to take things at their face value, and this tendency rules until we find it necessary, for theoretical or practical reasons, to discriminate between reality and appearances. Scepticism is not the spontaneous reaction of the mind, but is induced by the hard knocks which experience has in store for us. "As a rule we believe as much as we can. We would believe everything if we could. When objects are represented to us quite unsystematically they conflict but little with each other, and the number of them which in this chaotic manner we can believe is limitless. The primitive savage's mind is a jungle in which hallucinations, dreams, superstitions, conceptions, and sensible objects all flourish alongside of each other, unregulated except by the attention turning in this way or in that. The child's mind is the same. It is only



as objects become permanent and their relations fixed that discrepancies and contradictions are felt and must be settled in some stable way." *

Our procedure, then, is not in general to doubt where we can and believe where we must, but to believe where we can, and to doubt where we must. Here, as elsewhere, the coherence of facts is our standard of truth. Some perceptions are discarded as erroneous because they do not harmonize with the rest. These others are treated as correct perceptions until there is specific ground for doubt. We have here something analogous to the principle of law that every man is presumed to be innocent until he is proved guilty. Experiences like dreams, for example, are classified as erroneous, in spite of the fact that they are genuine sense-experiences, because what the dreams reveal cannot be reconciled with the experiences of our waking moments. We dream of being at our old home many miles away, or of meeting a friend who has long been dead, and the dream may seem as real as any other experience while it lasts. The reason why at a later time we reject the claims of these experiences to be true is not that as experiences they are different from other experiences, but that we find it impossible to admit their claims and at the same time to recognize the experiences of our waking moments as true. It is impossible that we should have been away during the night, as the dream affirms, unless the inference of the next morning is wrong in its assertion that we have been in the room continuously since the evening before. One or the other of the rival claims must give way. The

* James, *Psychology*, Vol. II., p. 299.

claim of the dream is accordingly set aside; and that of the waking experience is allowed. If dreams were regarded as true, chaos would be the result. The uniformity and orderliness which we seek to establish would be violated at every turn. There would be no standard of truth that we could apply. On the other hand, if dreams are classed as just dreams, they introduce no serious discord into our total experiences. They upset no generalizations or laws, but they may even affirm them, in so far as we can account for dreams by the laws that control cerebral activity, and by the psychological laws of association. In short, if dreams are relegated to the status of delusions, they fit in with other experiences in such a manner that the total experience gives promise of a unified and consistent whole, whereas the attempt to give authority to dreams would lead nowhere at all.

For exactly the same reason we discredit illusions such as the feats of jugglery. We may see a juggler take things out of a hat as plainly as we see a grocer take sugar from a barrel; yet we discredit the one and not the other. The reason does not lie in anything that pertains to the experiences themselves, but in their relation to other experiences. The grocer's act is so in accordance with common experience that we do not feel called upon to question our observation. The doubt is unmotivated. But in the case of the jugglery we are at once compelled to choose. Either our physics is wrong in its assertion that water is practically incompressible, or our present observation is wrong when it testifies that the juggler poured a barrellful or more of water from the hat. The laws

of physics accomplish too much towards the systemization of experience to be given up without a struggle. So we set down the present experience as a deception, in the hope that some day we shall be able to assimilate it more completely to the body of our other experiences and apply to it the laws which it now appears to set at naught. Meanwhile, we are much better off with but one or two such outstanding difficulties than if we should disorganize our whole past experience by rejecting the conclusions of physical science to which it bears witness.

The deliverances of memory are treated in exactly the same way. As with perceptions, we regard them as presumably true in the absence of reasons to the contrary. If we were to adopt a sceptical attitude at the outset and demand that the reliability of memory be proved to us, before we accept its testimony, we should never get a start. Just as perceptions are proved false by means of other perceptions, so memory can be convicted only at the bar of memory. No one would be able to prove even his own name without the assistance of other recollections, whether his own or those of other persons. If I happen to know that my memory is unreliable, it is because I remember how wayward it has been on previous occasions; or if the case be exceptionally bad, my knowledge is based on the statements of friends, who, on their part, simply report the things which their respective memories attest. Recollections that fit in with our experience, i.e., with our memories and perceptions and the inferences based thereon, are thereby proved to be true, while those which conflict are set aside as delusions. That perception and memory are com-

petent to give us truth, is a basal assumption or postulate in our conscious life. Hence each individual perception or recollection, regarded by itself, carries with it a certain measure of probability. In case of doubt the final court of appeal is the convergence of evidence.

Observation and Explanation.—It has already been said that the term ‘observation’ is loosely applied. It includes not only actual sense-impressions, but in general all objects and events that are easily understood. That is, the term covers both the sense-qualities apart from the inferential element, and the sense-qualities plus the inference. Whenever the interpretation of a perception suggests itself spontaneously and immediately, we are inclined to regard the whole as a fact of observation. Thus, as we commonly say, we observe that the man is excited or that the horse is frightened. We are at no loss to interpret our perceptions, nor are errors in such interpretation relatively frequent. Hence perception and interpretation are fused in our minds and both seem to be immediately given. If the interpretation that we desire is not forthcoming in this immediate fashion, but requires an effort, we tend to set the interpretation over against the perception and call it an explanation. To interpret is to relate to other facts. Both observation and explanation, therefore, are forms of interpretation. That sparks explode powder is usually regarded as a matter of observation, because we unhesitatingly assume a causal connection between the two events, although the causal connection is not a matter of sense-perception. The explosion is said, on the other hand, to be explained

when the chemical process involved in the explosion is made clear. The explanation relates the fact in question to a still wider range of facts; and the more completely this is done, the more complete is our explanation. Observation in the wider sense, therefore, is a matter of theory, in the same sense as the most complex explanation; and incorrect observation means a failure to analyze out all the important elements of the situation (*cf.* p. 141). To conclude, then, the term observation, in the narrower sense, applies only to the awareness of qualities presented to the senses. If, however, the term be taken in the wider and more usual sense, observation differs from explanation only in degree, and the line between the two cannot be closely drawn.

A word of warning may be added. As was suggested just now, explanation advances in proportion as the fact to be explained is related to other facts. Thus lightning is explained when it is found to be a case of electricity. The demand for explanation, therefore, is properly met, if we are able to subsume the given case under a general law, i.e., group it with a class of cases, for this enables us to apply what we already know to the case in hand. To classify a new case with other cases, then, constitutes explanation, provided that by so doing we are enabled to see the new case in new relations. But unless new knowledge is gained, we have merely given a name to the new fact; and there is danger that the naming be mistaken for explanation. "At a surgical operation I once heard a bystander ask a doctor why the patient breathed so deeply. 'Because ether is a respiratory stimulant,' the doctor answered.

' Ah! ' said the questioner, as if that were a good explanation. But this is like saying that cyanide of potassium kills because it is a ' poison,' or that it is so cold to-night because it is ' winter,' or that we have five fingers because we are ' pentadactyls.' '' *

* James, *Pragmatism*, p. 263.

CHAPTER XIV

THE NATURE OF REASONING

After the preceding survey of the processes by which knowledge is built up, we are in a position to inquire a little more closely into the nature of reasoning or inference. It has been shown that the recognition of resemblance and difference plays a leading part in the extension of knowledge. Since experience alone can guide our reasoning, it is necessary in every situation to find a point of contact with other experiences. Through comparison with other experiences we discover the important likeness or difference, which is then, by means of the Methods, isolated from its concomitants and associated with the attribute which it implies or to which it is related.

The Definition of Reasoning—We may, therefore, adopt the definition of reasoning that is offered by Professor James, who says that reasoning is “*the substitution of parts and their implications or consequences for wholes.*” * The part that is substituted for the whole is the point of resemblance or of difference. This attribute or circumstance is then treated as a ground for asserting the conclusion of the inference, i.e., the conclusion is regarded as its implication or consequence. If we say that Socrates is a man and therefore mortal, we substitute for the complex

* *Psychology*, Vol. II., p. 330.

whole, 'Socrates,' the attribute 'man,' and then pass on to the conclusion 'mortal,' because 'mortal' is regarded as implied in 'man.' Similarly when we infer to a generalization, we reason that A, B, and C are men (point of resemblance) and mortal, therefore all men are mortal, or the attribute 'man' implies the attribute 'mortal.' Here again we substitute for the several instances an attribute that is part of the whole and associate with that part the attribute which we regard as its implication.

This substitution is equally fundamental though somewhat less obvious in inferences with a negative conclusion. Take the syllogism:

All voters are taxpayers;
He is not a taxpayer;
Therefore he is not a voter.

This major premise is equivalent to, 'None who are not taxpayers are voters,' this second proposition being derivable from it by processes of obversion and conversion. The point of resemblance, therefore, is 'not a taxpayer,' which carries with it the implication 'not a voter.'

Logical Necessity.—The characteristic feature of inference is that it involves a 'Therefore.' 'A is X and therefore it is B.' The assertion 'A is X' is based upon the awareness of a resemblance: the 'therefore' indicates the awareness that X is a condition from which B follows as a necessary result; or, to put it differently, that X is the kind of fact which always involves B. If A is X it *must be* B. This *must be* is known as logical necessity, to dis-

tinguish it from the necessity that depends upon causation. If we say, for example, that food placed far back in the mouth is necessarily swallowed or that neglected children necessarily have bad manners, the necessity which is meant is not of a logical, but of a causal character. The statement affirms that under certain conditions certain consequences invariably result. The assertion—to take another illustration—that unsupported objects necessarily fall, need mean nothing further than that the connection between body and falling is not accidental, but involves a rule of sequence. The connection is operative whether we happen to be aware of the events or not; whereas logical necessity exists only for consciousness. Moreover, inference may proceed from effect to cause as readily as from cause to effect, or may deal with facts independently of causation, as in mathematics. By causal necessity, then, is meant in logic merely a certain invariable rule of sequence; by logical necessity is meant that we can avoid self-contradiction only by the acceptance of a certain inference as valid.

Judgment and Inference.—We have seen previously that the various forms of inference are marked off by no hard and fast lines. Analogy, generalization, and circumstantial evidence blend into each other as day blends into night. We must now observe that it is no easy matter to determine where inference begins. If we compare judgment and inference, we find that the former is an unsupported assertion, such as 'A is B'; whereas inference involves the characteristic feature of necessity, typified in 'A is X and *therefore* B.' At their extremes the two are

easily distinguished, but the distance between the extremes is occupied by intermediate forms, which are neither judgments pure and simple, nor yet explicit inferences, since they do not contain a clear consciousness of the grounds upon which they rest.

The element of necessity, which distinguishes inference, is incidental, as was pointed out, to the substitution of the part and its implication for the whole. When the part is discovered within the whole, we realize that the implication *must* likewise belong to the whole, because the part is known to carry with it this implication. But in the simpler forms of assertion these successive steps from whole to part and from part to implication do not appear. There is no clear distinction between whole and part, with the result that the implication is associated with the whole directly, and not by the more roundabout way. The part which constitutes the middle term, or the connecting link, between the whole and the implication, tends to drop out of sight. Instead, therefore, of A is X and X is B we have simply A is B , which is a simple judgment, the element of necessity having disappeared.

As an illustration, let us take the perceptive judgment, 'This is a tree.' The subject term of this proposition points out a complex sense-experience, which is described or classified by the predicate term as 'tree.' This proposition is commonly regarded as a statement of observation, but it goes far beyond what is given in the perception. What we get through perception is mainly certain colors and shapes. The assertion that the object is a tree implies vastly more than this. It asserts attributes not perceived at the

moment, such as that the tree is something which grows, that it may be destroyed by being cut down, that it furnishes protection against wind and sun, and so on. It seems, therefore, that in the actual sensory experience we recognize a point of resemblance to other experiences, and on the strength of this resemblance we assert these unperceived attributes. This is the same as saying that for the whole we substitute the part, viz., those attributes wherein the present experience resembles other experiences, and that we then assert the unperceived attributes as the implication of this part. But as a matter of fact we do not take these successive steps. Whole and part are not distinguished; they are telescoped, so to speak, and instead of an inference we have the simple judgment, 'this is a tree.'

In the case of a judgment like 'this is green,' if the judgment is taken to apply only to what is perceived, the analysis is more difficult, but the principle is precisely the same. The judgment classifies this particular quality as an instance of green. The green that is affirmed of 'this' is not something that belongs to this instance alone, is not merely this particular shade of green, but is something that is shared by others. Even in this judgment, therefore, we do not confine ourselves wholly to what is before us, but we imply a reference to other cases of green. The moment we say anything about an experience we are already beyond it. The judgment, 'this is green,' is equivalent to 'this resembles other instances of green.' It is true that we may not happen to think of other instances. But the fact that we classify this sense-quality shows that we recognize it, and such

recognition, as we have seen before, is an awareness of resemblance. Here again, therefore, we can break up the judgment into three stages:

This sense-perception (S)—this color-quality (M)—green (i.e., resemblance to other greens) (P).

The sense-perception as a whole has certain features which are ignored, such as the outline of the color and its position before us. For the whole perception we substitute the part, viz., the color-quality, and this carries with it the implication of resemblance to other instances of green. But in this case, as in the preceding, these three stages do not succeed each other. The second stage is suppressed, and we have simply, 'this is green.'

In this connection we may notice again a fact which was brought out in connection with the discussion of class names, viz., the tendency to substitute words for clear ideas. We have just seen that even a judgment like, 'This is green,' is a rather complex affair, if we give consideration to its implications. But instead of explicit analysis, we tend to content ourselves with felt resemblances, in which the distinction between whole and part is submerged. We recognize the quality and feel the appropriateness of the name, and that is all. Now if two things have the same name, our attention is explicitly called to the similarity between the things, to the neglect of the differences. Or we may say that the resemblances are emphasized at the expense of the differences. Our tendency to accept resemblances without clear-cut analysis, i.e., without definite contrast between like-

ness and difference, is thus reinforced by language, with the result that the latter becomes a treacherous instrument, as our study of ambiguity has shown.

From the foregoing discussion it appears that judgment partakes of the nature of inference in proportion as the connecting link between A and B comes into view; for this connecting link brings out the generalization, X is B. Wherever we find X, under the proper conditions, we may treat it as a datum that involves or implies B. Judgment, therefore, according to this view, "is merely the lower limit of inference, where datum and result are frankly fused in one statement. The logic of both processes is the same. In both, thought begins with A and elaborates it into B; but in the one it simply asserts B without explaining whether it is datum or result, and so it is judgment, a simple assertion that is not at the pains to justify itself; in the other it makes this distinction: its datum is specified, and becomes the premise, and its result is marked off and figures as conclusion. And between these clear cases we may in concrete thought have all kinds of intermediate stages; and it is, as has been rightly said, 'the merest chance' whether we adopt the more or the less explicit form. 'He must be a fool,' is an undoubted judgment. 'A man who acts like that is clearly a fool,' is in judgment form, but the distinction of ground and consequent is already made. Turn them into separate judgments with a connecting particle, 'he did this or that' (premise), 'so he must be a fool' (conclusion), and we have formal inference."*

From this point of view judgments are rudimentary

* Hobhouse, *The Theory of Knowledge*, pp. 219-220.

forms of inference. The differentiating feature is the element of logical necessity. If, therefore, our definition of reasoning is to exclude simple judgments, we must take it to mean that in the substitution of part and implication for whole, the distinction between part and whole must be maintained.

The Reasoning of Animals.—This character of judgments explains why the actual boundaries of inference are so hard to determine. The connecting link between subject and predicate may be present in any degree of explicitness. To ask where inference starts is much like asking where night leaves off and day begins. The perennial discussions about the reasoning of animals bear out this point. In spite of much argument, the question seems as far from solution as ever; which suggests that there is more need of definition than of argument. That reasoning is a vague term which easily becomes ambiguous seems usually not to be suspected at all. We find in fact that the mental processes of the higher animals are to all appearances the same in kind as ours; so that if we wish to contrast the reasoning of men with the reasoning of brutes, we must look for a difference of degree and not of kind.

That animals are capable in some sense of substituting the part and its implication for the whole does not admit of doubt. Some dogs, for example, are quick to recognize tramps and to adopt a hostile attitude towards them. It is clear that there is some generic mark or point of resemblance to which the dogs react, while other attributes of the persons classified as tramps are ignored. Made explicit the mental process would be something as follows:

This person (S)—Tramp (M)—Objectionable (P).

The important question, however, in this connection is to what extent animals are capable of making this relation explicit to themselves. This point it is difficult to determine. The fact that a person or an animal responds to a certain attribute of an object is no evidence that this attribute is clearly marked off from others with which it is conjoined. As we cross a crowded street we 'instinctively' avoid collisions with street-cars and automobiles, i.e., we react to a certain attribute which they possess in common, but we may never take the trouble to ascertain just what that attribute may be. In explicit form the inference would be:

This object (S)—Large Approaching Body (M)—To Be Avoided (P).

In a rudimentary form this inferential process does indeed occur on such occasions, but, as a rule, only in rudimentary form. Much of our reasoning is of this imperfect kind. And it may be that animals never get beyond this point. That such is the case is the consensus of opinion among psychologists. Animals apparently do not treat the part explicitly as a *condition* for the result, but vaguely join the whole to the result, without a clear awareness of the function performed by the part or connecting link. As a well-known psychologist states it, animals do not think the *therefore*.*

To consider the evidence upon which this opinion

* Lloyd Morgan, *Introduction to Comparative Psychology*, Chapter XVI., p. 287.

is based would take us too far afield. For our present purposes its correctness or incorrectness is a matter of no special importance. If we assume that it is correct, the superiority of the human mind lies in the fact that it is able to set free or detach completely the point of resemblance or of difference from its different contexts or settings. This is the process which lays the foundation of science. Animals are poorer reasoners, because they are less able to draw a sharp line between the whole and the attribute that belongs to the whole, i.e., they do not form clearly defined ideas, but tend to be guided wholly by undefined resemblance and difference. Human beings *can* in many instances form clearly defined ideas, although in fact much of our thinking resembles that of the brutes.

Why Some Persons Reason Better than Others.—

The difference between men and brutes, in the matter of reasoning, gives us the clue to the explanation of the differences in reasoning ability among men. It was pointed out before that points of resemblance or of difference may be 'felt' instead of being clearly discriminated. We may feel that a certain proposed course of conduct is right or that a proposed business venture will succeed, although we are unable to give reasons with any degree of adequateness. Or we may feel that the proposed conduct is not right, or that the business venture will fail, again without being able to justify our opinion. The propositions may seem plausible, i.e., they may resemble others that are unobjectionable, yet we feel that there is an important difference. This has been discussed before and needs no further elaboration. It should be noted,

however, that men differ enormously in their sensitiveness to resemblances and differences. This sensitiveness, moreover, may endow a man with practical wisdom, even though he be unlearned, and the lack of it makes possible the learned fool. However much we may know, we can never walk by the light of clearly defined knowledge alone. It may be added that this sensitiveness to undefined resemblances and differences may operate with certain materials or in certain fields and be conspicuously absent elsewhere. Every expert acquires a certain measure of it in his own field, but he may be curiously inefficient in others. The man of practical wisdom is not necessarily a good student, if given the opportunity; his range of interests may be too limited. And some of the mathematical prodigies who have attracted world-wide attention have been very ordinary, or worse, in other matters.

Leaving aside the reasoning that is based upon the awareness of undefined attributes, we may say that the test of reasoning lies in the power to form clear and distinct ideas, i.e., in the power to break up our subject-matter into its different parts or elements. By a clear and distinct idea is meant an idea that has a well-understood content and that is marked off definitely from everything else. Two reasons may be given why, with the same amount of effort and attention, some persons analyze more successfully than others.

One reason is that some persons possess more information than others. Attributes that have been singled out previously are recognized more easily than others, because the association established in previous

experience come to our aid in directing our attention and in giving greater prominence to details which might otherwise be overlooked. Resemblances and differences are thus detected with greater facility. This is the reason why a machinist is at home in a shop which to another person is a bewildering confusion of wheels and belts and other apparatus, or why a physician notices symptoms that are not perceived by a layman.

A second reason is that some persons have much more native ability than others in detecting resemblances and differences. According to modern psychology, this difference must ultimately be accounted for in terms of brain processes. When similar things occur to consciousness at the same time in different contexts (resemblance), or when different things occur in similar contexts (difference), we tend to take notice of them. Thus we can hardly fail to notice the likeness between a doll and a baby (resemblance amid difference), or the difference between a white and a black horse (difference amid resemblance).

Illustrations of more obscure resemblance and difference, in the detection of which the differences in native ability appear, have been supplied in the foregoing discussions. People vary greatly in the power of seeing analogies, and also in the power of criticizing analogies, i.e., in discovering important differences. Analogy, as we have seen, is a form of resemblance; whereas the criticism of analogy and the application of the Method of Difference concern themselves more particularly with differences. A classic instance of analogy is furnished in Newton's discovery of the law of gravitation. According to the well-

known story, a falling apple suggested to Newton a resemblance between its motion and the motion of the moon. Whether or not the story is true, Newton at all events discovered a resemblance between the motion of the moon and the motion of falling bodies. The resemblance is too slight to suggest itself readily; for the motion of a falling body does not resemble the actual motion of the moon, but merely one of the components into which the motion of the moon may be resolved. The two components or tendencies of a circular motion are a tendency towards the center of the circle, and a tendency at every point on the circle to go off on a tangent. This is exemplified by swinging in a circle a small body attached to a string. The pull exerted by the hand on the string is one component, the pull in the direction of tangential motion—the motion which occurs whenever the string is released—is the other; the resultant of the two is the circle. The resemblance noticed by Newton is between the motion of the falling body towards the center of the earth and the tendency of the moon towards the center of the circle that it describes about the earth, i.e., towards the earth itself. This resemblance furnished a starting-point for the discovery of further resemblances, which collectively constituted proof by circumstantial evidence.

The Development of Inference.—A study of inference seems to show that inference, judgment, and concept develop together. There is reason to think that none of them can be found in clear-cut form in the primitive or undeveloped mind. Judgment and inference, as we have seen, tend to fuse. In the lower forms of thinking, the inferential processes are not

unequivocally such, because a clear distinction of whole and part, and with it a clear awareness of logical necessity, are absent. This implies a like absence of clear and distinct ideas; since the reason that the inference is inexplicit is due to the fact that the point of resemblance or of difference is not defined, which tends to leave the distinction between whole and part obscure. And it seems clear that most, if not all, of the simple judgments with which we are familiar in adult life are simpler than they were at the outset. The judgment, 'this is a tree,' is simple because we have become so accustomed to the sight of trees that the judgment has become more or less automatic. If we imagine ourselves in doubt whether a given object is a tree, we find that the distinction between whole and part tends to be re-instated. Our mental process is then something as follows: This object has an upright trunk with a spreading top and makes a rustling noise in the wind; *therefore* it is a tree. Some such process as this occurs whenever we are in doubt; but as we become habituated to objects, the process is no longer necessary, and the simplification of the process through the telescoping of part and whole is an inevitable result.

It seems, then, that thinking takes as its starting-point a form of consciousness which has within it the promise and potency of concept, judgment, and inference, but which is none of these in fully developed form. Growth takes place, not through the mere addition of new parts, but through the development of what is present in germ. The process has been likened to that of growth within a living organ-

ism, because it is a process that involves a differentiation of structure through an inner growth.

This conclusion may be reinforced by the examination of a conflicting view. It is held by some logicians * that knowledge begins with the formation of concepts; that these are then combined into judgments, after which the judgments are combined into inferences. A judgment, according to this theory, consists of two ideas, corresponding respectively to the subject-term and the predicate-term. Judgments are formed by comparing these two ideas, to determine whether they 'agree' or 'disagree.' To say, for example, 'the sky is blue,' means that we compare the concept 'sky' with the concept 'blue' and find that the latter can be asserted of the former. A negative judgment, such as, 'the sky is not cloudy,' means that there is a lack of agreement. Inferences, finally, are formed by bringing together two judgments in the relation of major and minor premise. Reasoning, therefore, is an orderly progression from the simple to the complex; concept, judgment, and inference do not develop concomitantly, but in succession; and inference is merely the final result of a somewhat mechanical addition of part to part.

This view has the merit of simplicity, but it can hardly be squared with the facts. Thus there are certain judgments, such as 'it rains,' 'it is lightening,' 'it is cold,' etc., which do not seem to be formed by the joining or comparing of two ideas. It seems more natural to regard judgments of this kind as belonging to a more primitive type of thinking, a type

* Cf. Jevons, *Lessons in Logic*, pp. 9-16.

in which subject and predicate have not yet been differentiated, except as to verbal form. In the case of these judgments it is difficult to discover the two ideas that are supposed to be compared with each other, or to detect any mental process of comparison. The same is true, though perhaps less obviously, in 'judgments of existence,' e.g., 'God exists.'

Even in the more developed forms of judgment, moreover, there is good reason to think that the act of judging is something different from the comparing of two ideas. So far as the ideas are concerned, 'the horse runs' is the same as 'the running horse,' yet the former is a judgment, while the latter is not. We get a judgment when the single complex idea, 'the running horse,' is asserted to be a fact, or is asserted to be true of reality. The difference between 'the running horse' and 'horse' is merely a difference in complexity, the former being a single idea as well as the latter. But we find in 'the horse runs' the differentiation into subject and predicate, which means that the judgment does not merely assert the relatively undifferentiated idea 'horse,' but discriminates an attribute which characterizes the horse at the time when the judgment is made. The characteristic feature of judgment, therefore, is not the comparison of two ideas, but the assertion of a single idea as true of reality.

The view which we have been criticizing suggests that concepts antedate judgments. That some concepts precede some judgments is undoubtedly a fact, but that concepts precede all judgments is a different matter. "In making a judgment like 'iron is a metal,' it is, of course, necessary to have the concept

'iron' and the concept 'metal.' But what is implied in having a concept of anything? Let us suppose that a person is making the above-mentioned judgment for the first time—that is, really drawing a conclusion for himself, and not merely repeating words. He would begin, we may say, with the concept 'iron.' But if this concept is more than a mere word, if it really means anything, it must have been formed by a number of judgments. The concept 'iron,' if it has any significance for the persons using it, means a definite way of judging about some substance—that it is hard, malleable, tough, etc. The greater the number of judgments which the concept represents, the more meaning or significance it has; apart from the judgment, it is a mere word, and not a thought at all. . . . The concept, then, stands for the series of judgments which have already been made. Language comes to the aid of thought, and makes it possible to gather up such a set of judgments and represent them by a single expression—often by a single word. Every word that is the name of some logical concept represents intellectual work—the activity of judgment—in its formation. In learning our language, we inherit the word without doing the work.”*

A word or two should be added regarding the statement that judgment is the assertion of a single idea and that the subject of which the assertion is made is the system of facts which we call reality. “By a little torture of expression any judgment can be thrown into a form in which undefined reality is the general subject, and the whole mass of the judg-

* Creighton, *An Introductory Logic*, 2nd. ed., pp. 325-6.

ment is the predicate. 'William Pitt was a great statesman' = 'There was a great statesman named William Pitt'; 'The three angles of every triangle are equal to two right angles' = 'There are figures known as triangles with their three angles equal to two right angles'; 'All citizens are members of a moral order' = 'There is a moral order, including the relations of citizenship'; 'All trespassers will be prosecuted' = 'Here are conditions which insure the prosecution of possible trespassers.' Or you might always put a subject, 'Reality is such that'—'Reality is characterized by.'''* When there is no explicit differentiation into subject and predicate, as in the case of 'it is raining,' the reality to which the judgment relates is relatively undefined. When the differentiation has taken place, the subject term serves to point out the place at which, or the conditions under which, the predicate may be asserted of reality.

Negative judgments, such as, 'there are no centaurs,' have the same subject as affirmative judgments. A judgment like the above may readily be expressed as meaning, 'Reality is of such a character as to exclude centaurs.' It will be seen that negative judgments are not merely negative, but make positive assertions. In order to make an intelligent denial, it is necessary to be in possession of positive information, and hence negative judgments carry a positive implication.

Deduction, Induction, and Circumstantial Evidence.—It is customary in text-books on logic to classify arguments as deductive and inductive. An

* Bosanquet, *The Essentials of Logic*, pp. 107-8.

inference is deductive if it proceeds from a universal to a particular, in the manner typified in the first figure of the syllogism. On the other hand, an inference that passes from particular facts to a generalization is called an induction, as in the proof of universal and causal connections.

While it is true that some arguments are unmistakably deductive in character and that others are just as unmistakably inductive, the classification makes no provision for other forms of argument, and more particularly the complex forms included under circumstantial evidence. In fact, the classification takes account only of the more obvious and simple kinds of inference. In circumstantial evidence we may aim to prove a particular fact and not a generalization, so that the reasoning cannot be called inductive, as the word has just been defined. But on the other hand, it seems equally incorrect to call it a deduction from a single generalization. We do not first have the generalization and then proceed to apply it to the particular fact, but the complex underlying generalization is built up from various generalizations as we proceed. We do not proceed from the universal to the particular, but universal and particular are evolved by the same process. In all reasoning the aim is to see the general law in the particular case, but this end may be attained in various ways. If, therefore, the terms deduction and induction are used, it should be remembered that they do not cover the whole of the ground. Sometimes the term induction is used to apply to all the forms of reasoning employed by science. As thus used, however, it includes all forms of inference. The scientist employs induc-

tion, deduction—particularly in making predictions,—and circumstantial evidence, to suit the occasion. If induction is to include them all, the term has no longer any distinctive meaning and might as well be discarded.

CHAPTER XV

THE AUTHORITY OF THE TEST OF TRUTH

The Argument for Scepticism.—In the foregoing discussions it has been contended that reasoning must start with certain fundamental assumptions or postulates, such as the uniformity of nature and the reliability of our faculties. These cannot be proved in advance, but must be justified by their results. This justification is furnished by the convergence of evidence. When the various items of our experience combine in such a way that they support each other and suggest no ground for doubt, we have all the evidence that is possible or necessary.

It may be argued, however, that our test of certainty is, after all, only a negative test. It tells us that whenever a motivated doubt finds standing ground, there certainty has not yet been attained; but it does not guarantee to us that if no such doubt can be found we may be sure that the evidence is sufficient. The doubt may not be found, because we did not examine the evidence with sufficient care, or because some of the facts were not accessible. The most promising chain of circumstantial evidence may suddenly break in two. In spite of much convergent evidence, men who were convicted of crimes have turned out to be innocent; the sun has been found not to move about the earth, and 'light as air' has

proved to be a myth. Experience has shown over and over again that the human mind is fallible, even when it deems itself most certain.

Since there is no positive test by which we may know when the evidence is sufficient for certainty, it may plausibly be urged that there is no belief which is beyond the reach of motivated doubt. The convergence of evidence which we find within a certain circle of experience may be upset when the circle widens so as to admit new facts. Our total experience includes at best but a small fraction of all that is to be known. In view of this situation, the fact that we have erred before raises a presumption, however small, against any conclusion that we may reach. The possibility of error, even when no ground can be found for a motivated doubt, is itself a ground for motivated doubt, and hence the entire structure of knowledge is reared upon a foundation of sand.

It seems possible, therefore, to play the sceptic at every point. No matter what the special issue may be, there is always room for a 'reasonable' doubt. Until experience is all in, the possibility remains that many things which we now regard as indubitable will be overthrown. To what extent this could occur, no man can say. The possible experience for which we must make allowance is of indefinite extent. Moreover, the history of philosophy seems to indicate that in his endeavors to understand the constitution of the universe, man is struggling with a problem which is too complex for his powers; or, in other words, that if his intellect could be compared with that of a being to whom all the secrets of the universe were

revealed, the difference would be overwhelming. If this be the case, however, it may well be that to such a mind, all facts would appear vastly different from the way in which they appear to us, and that our best-accredited facts are little more than caricatures of the truth.

The point of this argument is that the experience of error in the past justifies a doubt in each new situation, even if no specific fact can be found in the new situation as a basis for the doubt. The question thus raised is whether a doubt of this kind can be considered a motivated doubt. If so, the door is opened to a most radical scepticism. Not only is practical certainty an impossibility, since no amount of evidence can eliminate this last outstanding doubt, but the doubt may be considered a sufficient warrant for the suspension of judgment with regard to any question that may arise.

Criticism of the Argument.—This reasoning, however, while apparently cogent, involves a contradiction. It claims that the experience of error makes certainty impossible, no matter how much evidence may converge upon the given point. The convergence of evidence, then, is not a test of truth which can rid us of a paralyzing doubt. This inference, it will be seen, takes the fact of error for granted and makes this fact its point of departure. But how do we know that error is a fact? This question the sceptic is bound to answer in the same way as everybody else. He knows this on the basis of observation and memory, and he distinguishes between the true and the false in his observations and memories by means of the convergence of evidence. In other words, he

uses precisely the same test of truth as everybody else. If, however, we grant his contention that no such convergence of evidence can compel us to cast aside our doubt, it is open to us to doubt whether error is really a fact. It is scarcely legitimate to assume that the convergence of evidence is competent to establish beyond doubt the fact of error, and then to use this fact in order to prove that the convergence of evidence cannot establish a fact of any kind. If, therefore, the experience of error is made a basis for universal doubt, the doubt itself reinstates the test of truth which it is supposed to overthrow.

The inference, then, which we seem compelled to draw, is that the experience of error is not a sufficient warrant for doubt, unless the previous experience is a parallel, in some specific feature, to the case which is affected by the doubt. That errors have occurred is a fact which has absolutely no bearing upon the question of the truth or falsity of a given inference, except in so far as the present case is like those other cases. Errors have occurred in the past and will occur in the future, but every one is justified, according to logical standards, if, after a proper scrutiny of the facts has failed to reveal any specific reason for a doubt, he treats the conclusion as a certainty. We cannot assume, as this form of scepticism does, that some knowledge is reliable, and then infer, by means of this assumption, that the whole of knowledge is unreliable. If a doubt is cast upon all knowledge, the doubt is necessarily of the unmotivated kind. In general we may say that a scepticism which attempts to motivate its doubts, i.e., a scepticism which gives its reasons, is always inconsistent with itself,

because it assumes in its premises a test of truth which it denies in its conclusion.

Unreasoned Scepticism.—If we grant that theoretical scepticism, i.e., the scepticism which defends itself with reasons, can be convicted of inconsistency, there remains only one other form of scepticism, viz., the scepticism which does not seek to justify itself by argument. It may be that human beings, constituted as they are, must necessarily rely upon the convergence of evidence as a test of truth, if they are to reason at all, but this does not prove that the test of truth which they employ is, in fact, a reliable test. As was suggested a moment ago, our best-accredited results may be nothing but a tissue of error, a source of laughter for the gods. Our test of truth does indeed forbid unmotivated doubt, but the authority of this test cannot be established by arguments which do not presuppose it, nor is this authority a self-evident fact. If, therefore, the authority of the test of truth be denied, until its claim has been established by reasoning, we have a form of scepticism that is invulnerable to argument. On what grounds, then, does this authority rest? What right have we to assert that every doubt must be motivated?

The Non-Rational Basis for the Test of Truth.—

The answer to the questions just raised is that unmotivated doubt is incompatible with the conditions of our existence. If we were mere bystanders in the game of life, with absolutely no needs of any sort, and with no desire for knowledge, an attitude of unmotivated doubt would not be so utterly impossible as we now find it to be. The game is so intensely

real to us because we are participants in it. To the average healthy-minded person an attitude of doubt on all questions would rightly be regarded as a hopeless abnormality, since it would leave no room for any of our spontaneous beliefs or for any intelligent activity. To the common-sense man such an attitude 'makes no sense.' We insist that doubt shall be motivated, because we are constrained thereto, not by argument, but by the various impulses of our being, both cognitive and practical, which clamor for expression.

According to this view, the overpowering sense of reality which we ordinarily have in the presence of our environment, and which is so foreign to the attitude of doubt, betokens the action of good healthy red blood in our veins. It is not surprising, therefore, that in certain abnormal cases this sense of reality should be considerably diminished. "In certain forms of melancholic perversion of the sensibilities and reactive powers, nothing touches us intimately, rouses us, or weakens natural feeling. The consequence is the complaint so often heard from melancholic patients, that nothing is believed by them as it used to be, and that all sense of reality is fled from life. They are sheathed in India-rubber; nothing penetrates to the quick or draws blood, as it were. . . . 'I see, I hear,' such patients say, 'but the objects do not reach me, it is as if there were a wall between me and the outer world.' " * The same writer quotes, as an illustration, the following: " 'When I reflect on the fact that I have made my appearance by accident upon a globe itself whirled

* James, *Psychology*, Vol. II., p. 298.

through space as the sport of the catastrophes of the heavens,' says Madame Ackerman; 'when I see myself surrounded by beings as ephemeral and incomprehensible as I am myself, and all excitedly pursuing pure chimeras, I experience a strange feeling of being in a dream. It seems to me as if I have loved and suffered and that ere long I shall die, in a dream. My last word will be, I have been dreaming.' " *

The reason, then, why we accept the test of truth and disregard unmotivated doubt is that the only alternative to this is the stagnation of all our mental and physical powers. An uncompromising scepticism of this kind is so intolerably artificial to us because it is so completely out of accord with the natural tendencies of our being. It proposes to condemn us to a state of inglorious passivity, a proposal against which all our normal impulses arise in protest. Since this protest is too strong to be disregarded, we accept as our test of truth the convergence of evidence, and we legitimate the results achieved through its aid by ruling this all-destroying doubt out of court.

To What Extent Our Interests May Properly Determine Belief.—According to the position maintained in the preceding paragraph, all inference rests ultimately upon assumptions which are non-rational in character, i.e., assumptions which have no evidence in their favor. These assumptions are made because it suits our purpose or interests to do so. Or, to be a little more accurate, we make certain unproved and unprovable assumptions right from the start,

* *The Varieties of Religious Experience*, p. 63. Cf. also *The Will to Believe*, Chapter I., by the same author.

without knowing that we do so, but simply because we are built that way. Later on, when we turn logicians and reflect upon our methods, we discover what we have been doing, and we then find that no reasons can be adduced in justification of this procedure, except reasons of a practical kind. Our next question is to what extent this appeal to practical reasons is legitimate. Is it permissible to believe whatever we may find necessary to 'avert the stagnation of all our mental and physical powers'?

This question is of interest, because the appeal to practical need may on occasion seem to claim more authority than we are entitled to accord to it. An instance of such appeal is found in the following lines from Tennyson :

My own dim life should teach me this,
That life shall live for evermore,
Else earth is darkness at the core,
And dust and ashes all that is;

This round of green, this orb of flame,
Fantastic beauty; such as lurks
In some wild poet, when he works
Without a conscience or an aim.

What then were God to such as I?
'Twere hardly worth my while to choose
Of things all mortal, or to use
A little patience ere I die;

'Twere best at once to sink to peace,
Like birds the charming serpent draws,
To drop head-foremost in the jaws
Of vacant darkness and to cease.*

* *In Memoriam*, XXXIV.

At first sight the position here taken by Tennyson is identical with the one defended in this chapter. Tennyson argues that without the belief in immortality, 'earth is darkness at the core,' and he seems to imply that this fact legitimates the belief. In a similar way we have reasoned that our test of truth is validated by the fact that its rejection involves consequences which we are unwilling to accept.

A closer comparison, however, reveals an important difference between the two cases. In accepting the test of truth we commit ourselves, indeed, to a certain mode of procedure, but we do not determine in advance what specific facts our world is to contain. In adopting this test we are obliged to pin our faith to the uniformity of nature and to the reliability of our faculties, but what particular uniformities or what particular facts we shall find, experience alone can reveal. In other words, we can try our hand at reasoning or abstain, as we may prefer; but if we care to make an attempt, we must abide by the rules of the game. In justifying the validity of our test of truth by an appeal to our practical needs, we justify a method or mode of procedure, and this method determines how the belief in specific facts is to be supported. Hence the principles of reasoning can at first be accepted unconsciously; there is no conscious belief in the validity of these principles until reflection has shown us what is implied in inference. But to justify the belief in a particular fact, such as immortality, by our practical needs, is a different matter. Here we necessarily start with a conscious belief, and this belief, however important it may be, is not indispensable to inference. The fact

in question is the same kind of fact, so far as logic is concerned, as the facts which are established by convergence of evidence. The appeal, therefore, to practical needs, instead of convergence of evidence, means that we employ two standards or tests of truth instead of one. In this second criterion we not only assume that the universe is of such a character as to satisfy our fundamental needs, but we become involved in the difficulty that the two standards may conflict. Since the two standards are on equal footing, one has as much claim to prevail as the other; and so it may happen that the individual feels justified in setting aside the available evidence, if it conflicts with his cherished desires. That such a course would be justified seems to be asserted by Tennyson, when, in arguing against materialism, he maintains that men are,

Not only cunning casts in clay:
 Let Science prove we are, and then
 What matters Science unto men,
 At least to me? I would not stay.*

Such an attitude, it is plain, robs our test of truth of all authority. If evidence, in the ordinary sense of the term, may be set aside at one point, because it happens to be distasteful, it may be set aside at all points. We cannot afford to play fast and loose with our criterion. To withhold our consent when the evidence is conclusive is to forswear rationality. Reason is, indeed, merely another name for that harmony of our experiences which we have called con-

* *Ibid.*, CXX.

vergence of evidence. We conclude, therefore, that desire justifies the acceptance of the principles of reasoning, or 'the rules of the game,' but that it does not warrant the belief in anything else.

Belief and Evidence.—The conclusion just reached inevitably raises a further question. Granted that we are not permitted to reject any fact which is established by convergence of evidence, is it also true that we are entitled to believe nothing except what is accredited by the same test? If man's sole business in life were the pursuit of science, this conclusion would perhaps be tenable. Yet even in science we may rely upon unanalyzed 'impressions,' in the hope that some day our faith will be justified. Thus Linnæus is reported to have said, regarding his classification of species, "I will not give my reasons for the distribution of the natural orders which I have published. You or some other persons, after twenty or after fifty years, will discover them and see that I was right."* The discovery thus predicted was realized when it was found that Linnæus had unconsciously been classifying along the lines of evolution or descent. In the preceding pages our attention has at various times been called to the fact that inarticulate perception or 'intuition' constantly outruns our powers of analysis and formulation. The degree of assurance inspired by such intuitions may be immeasurably greater than our ability to justify them. Yet such assurance cannot be condemned, if we hold it at all times subject to the results of inquiry and evidence.

To apply this in detail to matters of religious belief

* Romanes, *Darwin and After Darwin*, Vol. I., p. 26.

would carry us too far afield. In general, however, we may say that if the drift of a person's experience leads him to some belief, such as that in "a power not ourselves that makes for righteousness," or in a future life, but if he is at all times open to evidence, such belief is not in conflict with logic. Just as we may react in a very definite way to the impression made upon us by a particular person or a given situation, so we may react in a definite and vivid way upon life as a whole. We may be strongly persuaded that the powers that be and upon which our destiny depends are divine or that they are diabolic, without being able to give the reasons for our belief. Apart from specific evidence, a religious belief of this kind is properly a tentative faith or hope in things seen through a glass, darkly; a working hypothesis, and not a dogmatic and irrevocable conclusion. Held in this way, the belief violates none of the canons of logic, although it is held without evidence, in the sense that the evidence in question is insusceptible of formulation. Since the evidence cannot be set down in detail, it scarcely admits of close scrutiny and critical evaluation. For this reason the belief commends itself primarily only to the person directly concerned; a fact which indicates why religious beliefs, in common with certain other beliefs, are to a large extent essentially of a private and incommunicable character.*

Mysticism and the Test of Truth.—It has sometimes been claimed, in the interests of religion, that certain things can be known without reliance upon

* Compare W. K. Clifford, "The Ethics of Belief," in *Lectures and Essays*, Vol. II.

this test of truth. Religious truth, it is said, comes to us through a unique channel and it comes properly accredited, but its credentials are not furnished by convergence of evidence. Certain facts, such as the existence of God and his attitude towards the individual, the divine character of Scripture, or the efficacy of a certain plan of salvation, are known to us in a way that is totally different from our ordinary forms of knowing, and in a way that neither admits of description nor requires any support from other experiences. The experiences in which this knowledge comes share with sense-perception the quality of *immediacy*, i.e., they are not inferential or mediate in character. They are, however, totally different from perception in other respects. They involve no special sense-organ, and they are not confined to physical objects. These experiences are incommunicable or *ineffable*; and they usually go by the name of mystical experiences. As a rule, they are conclusive evidence, for the person who possesses them, of the truths which they attest; but since they are personal and unsharable experiences, they cannot compel the belief of others.

As against the general claim that there are other forms of knowing besides those which we have been studying, it would doubtless be unwarranted to enter a general denial, without taking evidence on the subject. How many different forms of knowing there may be we have no right to determine dogmatically in advance. It must be insisted, however, that if this new knowledge conflicts with the knowledge which has been discussed in the preceding pages, the claims of this latter knowledge must be allowed, unless we

are willing to discredit the entire body of ordinary human experience. Our logic has no right to decide that other forms of knowing are impossible, but neither can it recognize any claims that conflict with its own. Thus the facts of science may point to evolution as the process by which things came to be as they are, whereas a revelation which is attested by mystical experiences may assert that the explanation lies in the special creation of fixed and immutable types. Wherever such disagreement occurs, the proof that rests upon convergence of evidence must be accepted, since we otherwise destroy the authority of the test of truth and open the door to a scepticism, with regard to our everyday experiences, that is as radical as can be imagined. In other words, if we assume, for the sake of the argument, that there are forms of knowing which do not depend upon the facts of sense-observation and memory, and inferences from these facts, we must nevertheless insist that such knowledge is subject to the same test as all other knowledge. All experiences have a *prima facie* claim to be true. The credibility of this other knowledge may be strengthened by the convergence of evidence, and weakened by its incompatibility with knowledge acquired in the usual way. The test of truth is applicable to all knowledge, regardless of its origin.

The fact, then, that experiences such as those called mystical are different in kind from ordinary experiences does not exempt their deliverances from the authority of the test of truth. And unless we abandon all rational standards of thinking, we are bound to conclude that mystical experiences may testify

to error. These experiences contradict each other in such a way that no other conclusion is possible. Religious mysticism "has been both ascetic and antinomianly self-indulgent within the Christian church. It is dualistic in Sankhya, and monistic in Vedanta philosophy. I called it pantheistic; but the great Spanish mystics are anything but pantheists. They are with few exceptions non-metaphysical minds, for whom 'the category of personality' is absolute. The 'union' of man with God is for them much more like an occasional miracle than like an original identity. How different again, apart from the happiness common to all, is the mysticism of Walt Whitman, Edward Carpenter, Richard Jeffries, and other naturalistic pantheists, from the more distinctively Christian sort. The fact is that the mystical feeling of enlargement, union, and emancipation has no specific intellectual content whatever of its own. It is capable of forming matrimonial alliances with material furnished by the most diverse philosophies and theologies, provided only they can find a place in their framework for its peculiar emotional mood. We have no right, therefore, to invoke its prestige as distinctively in favor of any special belief, such as that in absolute idealism, or in the absolute monistic identity, or in the absolute goodness, of the world. It is only relatively in favor of all these things—it passes out of common human consciousness in the direction in which they lie."*

Whether mystical experiences are entitled to serious consideration as revelations of truth or are to be set aside as a mere psychological peculiarity of cer-

* James, *The Varieties of Religious Experience*, p. 425.

tain persons, is a question about which experts are not agreed. Since the question falls outside the domain of logic, we can afford to leave it undecided here. But if we assume that they are a genuine source of information, we can at best treat them only as we should treat our new experiences, if we were suddenly endowed with a sixth sense. Let us suppose that on the strength of his mystical experiences a person believes that there is a soul of goodness in things evil, a divinity that somehow shapes our ends. How he knows this he is, of course, quite unable to state, yet this conviction may be as deep-rooted as the belief in the reality of an external world or in our own personal existence. We have here a form of testimony which, as to its directness, is very much like recollection and sense-perception.* All these forms of direct testimony may at a later time turn out to be wrong, but they seem to be true when they present themselves, and they all make exactly the same demand upon our faith. We have seen before that we cannot first stop and argue whether our observations and recollections are reliable. Such a procedure would stultify the quest for knowledge from the start. If this condition is unreasonable in the case of observation and memory, the same is true with regard to mystical experiences, provided it cannot be shown satisfactorily that these experiences are erroneous from start to finish. They would then have the same right to be heard, and they could be condemned only by the combined testimony of other experiences. In so far as the mystical

* Cf. Matthew Arnold, "Our Masses and the Bible," Section III., in *Literature and Dogma*.

experience asserted facts that conflict with facts established by convergence of evidence, it would be discredited. In so far as it could claim the support of other facts it would be proved. In so far as it were neither proved nor disproved by other facts, its position would correspond to that of an unsupported postulate. Logically the belief could not be condemned, although it might prove to be wrong. The test of truth is rightfully the same for the mystic and the non-mystic, but unless the mystical experience can be discredited, we are bound to conclude that human experience has not proceeded far enough or is not wide enough to show definitely which standpoint is correct. Hence the mystic makes constant appeal to his peculiar experience as presumptive evidence for his position; but since this experience is not shared by his opponent, the latter refuses to concede that this evidence is entitled to recognition. While the test of truth is the same, the data are different in the two cases, and this necessitates a difference in the ultimate conclusions.

These considerations enable us to see why it is that, although religions constantly change, religion nevertheless endures. Whether the religion be based upon inarticulate 'impression' or upon mysticism, or upon both, the individual naturally and inevitably interprets his religious experiences in the light of the knowledge that he happens to possess; and as this knowledge grows, a change in his religious beliefs becomes inevitable. The 'power not ourselves that makes for righteousness' may be, and has been, interpreted in many different ways, conception after conception having been discarded as inadequate in

the progress from savagery to civilization. The untenability of former beliefs does not necessarily or as a rule result in the conviction that religious experiences are essentially untrustworthy, but it merely suggests that these experiences have been wrongly interpreted. As long, therefore, as these experiences continue, the individuals that possess them will tend to persist in the belief that there is an unseen order of things upon which the visible and tangible things of everyday life are somehow dependent; and he will try, as best he may, to bring this belief into harmony with the totality of his other beliefs.

We may sum up the preceding discussion in this way: Unless we are prepared to maintain an attitude of scepticism towards the entire body of organized human experience, we are compelled to recognize as supreme the authority of our test of truth. If the facts cohere in such a manner as to support each other, they are and must be, so far forth, accepted as true. Conversely, any experience that makes against the whole weight of evidence which is furnished by our other experiences must be accounted a delusion. There is, however, in the mind of each person a region that has not yet been annexed by scientific exploration. Belief on the ground of unanalyzed evidence or 'intuition' is logically permissible, on condition that all tangible evidence be accorded due recognition when it presents itself. Furthermore, every form of experience raises an antecedent presumption of its truth. If such presumptive truth is asserted for observation and memory, it cannot be denied to mystical experiences, unless we have reason to think that important differences exist.

Finally, all doubts that have no other basis than the fact that errors may occur even when the evidence seems decisive, are treated as unmotivated doubts. This is done because doubt on such terms would inhibit all activity and thus do violence to all our spontaneous demands and tendencies. It appears, therefore, that the authority of the test of truth cannot be successfully defended against all doubt by argument, but that the ultimate sanction or warrant for this authority springs from the demand which we make upon our environment.

CHAPTER XVI

THE PROBLEM OF SENSE-PERCEPTION

It has previously been argued that the trustworthiness of observation is a postulate of reasoning. We get a start by taking for granted that sense-perception can give us a certain measure of truth concerning the nature of our surroundings. This faith finds constant justification in everyday life. By trusting our perceptions we find it possible to adjust ourselves to our environment in such a way as to profit by what is expedient for us and to avoid what is injurious. Sense-perception enables us to provide for our daily wants and to protect ourselves against the dangers which constantly threaten our existence or our well-being.

The Subjectivity of Sense-Qualities.—Although it cannot be denied that sense-perception is adapted to the purpose of securing adjustment, the question still remains whether it presents objects to us ‘just as they are,’ i.e., whether the object is perceived just as it exists when it is not perceived. This problem, which common sense scarcely considers, has been the subject of much debate and wide divergence of opinion.

In order to appreciate the nature of the problem we must consider how it arises. As long as we do not reflect upon the matter, we are inclined to ascribe

all perceived qualities directly to the object. Certain experiences, however, force us, apparently, to distinguish between what belongs to the object and what is 'in the mind.' Thus the pain resulting from the prick of a pin or from a burn is not supposed to reside in the pin or in the fire, but in the mind. Similarly a lump of sugar is assumed to be sweet and a rose to be fragrant only in the sense that when we respectively taste or smell these objects we have the experience of sweetness or fragrance. The sugar by itself is not sweet, but it has the power of giving us a certain taste-sensation, and a similar judgment is held with respect to the fragrance of the rose. "Sweetness is not really in the sapid thing, because, the thing remaining unaltered, the sweetness is changed into bitter, as in the case of fever or otherwise vitiated palate." *

This distinction between qualities which inhere in objects and qualities which exist only in consciousness tends to appear also in connection with other sense-qualities. "He that will consider that the same fire that at one distance produces in us the sensation of warmth, does at a nearer approach produce in us the far different sensation of pain, ought to bethink himself what reason he has to say that this idea of warmth, which was produced in him by the fire, is actually in the fire; and his idea of pain, which the same fire produced in him the same way, is not in the fire." † It was observed long ago that if one of our hands is cold, and the other warm, and

* Berkeley, *Principles of Human Knowledge*, Part I., § 14.

† Locke, *Essay on the Human Understanding*, Book II., Chapter VIII, § 16.

if we put both into a vessel of tepid water, the water will seem warm to the one hand and cold to the other. Since the water cannot be both warm and cold at the same time, the suggestion arises that these perceptions are purely mental facts. This suggestion is supported by physical science, which reduces heat to a certain motion of air-waves. These air-waves, it seems, are in themselves neither warm nor cold, but they are capable of causing sensations of warm and cold whenever they act upon our sense-organs. Warm and cold, therefore, are qualities that do not belong to objects, but are dependent for their existence upon consciousness.

The reason why we are disposed to accept this conclusion appears to be twofold. In the first place, we find it difficult to conceive what a taste or a temperature may be apart from a consciousness for which it exists. We realize that these qualities are necessarily relative to some sense-organ. How sweet or how warm an object is depends upon the condition of our sense-organs, and we can discover no reason why one condition of the sense-organ rather than another should be set up as the standard condition. In other words, we are unable to discover any absolute standard for the measurement of these qualities as they might be supposed to exist when not experienced. Every actual experience of taste and temperature is determined by the relation of the stimulus to a certain sense-organ, and from this circle of relativity we can find no means of escape. In the second place, physical science seems able to explain these experiences in terms of cause and effect. The thermometer does not measure temperature directly,

but records the expansion of the mercury. When the conditions exist which cause mercury to expand a certain amount, sentient beings have the experience of warmth, but it is not found necessary to assume that there is any such thing as warmth, except when the agencies that cause the mercury to expand act upon a sentient organism.

According to this view, then, temperature is represented by air-waves, in any situation where no sentient beings are present. We are not entitled to say that in such a situation objects are either warm or cold, because these terms presuppose a relation between the objects and a conscious being. If this is the case, it seems evident that any attribute or quality which exists, even though not experienced, must be of a kind that does not presuppose such a relation. Thus if we assert that a given object has a certain color or size or shape when not perceived, we take for granted that these qualities are essentially different from temperature. The question how cold a block of ice is when no one touches it, or is in any way affected by it, is apparently unanswerable (unless the question is meant to refer merely to the effect of the ice upon a thermometer). We commonly suppose, however, that a similar question as to its color or its shape or its size is a different matter. We tend to assume that we can ascertain what these qualities are 'in themselves,' i.e., what they are when they are not the objects of any experience.

When we consider the facts in the case, however, it appears that these qualities are on the same footing with the quality of temperature. If we ask, for example, what the size of a given object may be, we

find that the answer depends upon the nature and the condition of the sense-organ through which the size is experienced. "The interior of one's mouth cavity feels larger when explored by the tongue than when looked at. The crater of a newly-extracted tooth, and the movements of a loose tooth in its socket, feel quite monstrous. A midge buzzing against the drum of the ear will often feel as big as a butterfly."* Again, "Apply the blunt end of a pencil to the forehead, to the lips, to the back of the hand, to the tip of a finger, to the drum of the ear. The resulting tactual sensations vary conspicuously in extent, though the areas of the skin affected are throughout equal and the surface with which they are brought in contact remains constant in size. None of the tactual sensations has any better logical claim than the others to be identified with the real extent either of the skin stimulated or of the surface applied to it; and their rival claims are mutually destructive. Skin sensibility is also variable in this respect from one individual to another; it is different in the child and the adult; it is affected by disease of the brain, and by the use of drugs such as narcotics."†

It is evident that the question as to size cannot be answered merely by resort to measurement. If we should find by measurement that an object is an inch long, the question recurs, how long is an inch? Visual perceptions and tactual perceptions present conflicting reports, and we seem unable to decide which of these reports is more correct than the others.

* James, *Psychology*, Vol. II., p. 139.

† G. F. Stout, *Proceedings of the Aristotelian Society*, 1903-4, p. 151.

In everyday life, it is true, we accord pre-eminence to the deliverances of visual perceptions. Thus we commonly say that the cavity in a tooth feels bigger than it 'really' is. This, however, is merely a matter of convenience. We adopt visual perception as our standard, because it plays so important a part in practical life. Our visual perceptions have indeed been modified through association with the tactual perceptions of the hands, but they fail to harmonize with other tactual perceptions, and so these latter are classed as unreal. But even if we assume, for the sake of the argument, that vision is more reliable than some of the tactual perceptions, our difficulty presents itself anew. The apparent size of an object varies with its distance from the retina. In practice the size selected as the 'real' size is usually the size that we see when the object is at such a distance as to enable us to see both its contour and a maximum of detail within its boundaries. But this standard is departed from when the object is placed under a microscope. We then say that the object appears larger than it really is, because the object as it appears under the microscope is compared with its appearance as seen with the naked eye. In short, we are unable to justify the selection of one visual perception rather than another as the perception which gives us the 'real' size. When we consider, further, that a comparison of different forms of animals reveals wide differences in the structure of the eye and thus gives ground for the supposition that there must be wide differences in visual perception as well, the difficulty becomes still more formidable. As with temperature, the difficulty is to understand

what is meant by size, independently of all relations to a sense-organ. We seem unable to determine what the size of anything is 'in itself.' We can at best only assert that an object has a certain size under certain conditions, such as a certain specified type of sense-organ and a certain fixed point of view.

A little reflection will show that a similar conclusion is required with respect to shape. Apparent shapes vary quite as much as apparent sizes; and the variations are increased when we take into account the appearances of objects under the microscope. An object which, when seen with the unaided eye, appears to possess a smooth round edge, may present an extremely jagged contour when seen under the microscope, the degree of roughness depending upon the magnifying powers of the instrument.

With regard to attributes like colors and sounds we arrive at the same result. Psychology teaches that the psychical result of a stimulus affecting a sense-organ is changed if other stimuli affect the same sense-organ, either at the same time or immediately before. This fact gives rise to the phenomena of contrast, which, "although characterizing in a measure all sense domains, and for that matter all conscious processes, are especially striking in vision. Yellow and blue appear respectively yellower and bluer, when seen side by side, than when seen apart. This seems to be largely because of the fact that the eye moves slightly from one to the other; and the eye fatigued for blue already has a disposition to react with the yellow after-image. If the part of the retina containing this yellow after-image proc-

ess is then exposed to the real *objective* yellow, the power of the stimulus is much enhanced, and we see a deeper, more intense yellow than we otherwise should. This phenomenon is called successive contrast. Simultaneous contrast is an even more interesting phenomenon, and may be illustrated by putting a small bit of gray paper upon any colored field, and then covering the whole with thin white tissue paper. The gray patch, under such conditions, always appears as a color complementary to that of the field, i.e., it will appear blue, when the field is yellow; yellow, when it is blue; reddish when it is green, etc. . . . Our color sensations are dependent, not only upon the color of the objects immediately fixated, but also upon the colors surrounding it, and upon the immediately preceding stimulation.”*

As suggested by this quotation, other perceptions are likewise subject to the law of contrast. Notes modify each other in a chord; and the first peal of a bell, breaking in upon a previous silence, has a more ‘aggressive’ sound than the second which immediately follows it. The distance between the objects whence the sound proceeds and the ear is also an important factor. It seems clear that the question as to the ‘absolute’ color or sound of an object, like the question regarding ‘absolute’ size or shape or temperature, is quite unanswerable. There is always implied a reference to the condition of the sense-organ and to the limitations imposed by a specific situation. That is, we must take account both of the relation of the object to the sense-organ or perceiving mind, and of its relation to other things, as in color and

* Angell. *Psychology*, p. 112.

sound contrast. We have apparently no standard by which 'absolute' qualities may be determined.

Primary and Secondary Qualities.—It was suggested, a few pages back, that the difficulty here discussed finds a certain recognition on the part of physical science. Temperature and sound, for example, are often regarded as merely effects produced by air-waves and are not supposed to exist in the absence of the appropriate sense-organs. Similarly color is the effect produced by ether-waves upon the retina of the eye. The ether is not itself colored, but it produces color by acting upon the organ of vision. All these sense-qualities, in other words, are made to depend upon consciousness and not upon objects. Consciousness is not regarded as merely the function of apprehending objective fact, but it becomes the source and origin of qualities which, originally ascribed to objects, have now been transferred from the realm of matter to that of mind. The growth of knowledge is characterized by a certain tendency to despoil matter, for as mind becomes richer in content, matter becomes poorer, since matter is invariably compelled to 'pay the bill.'

This procedure has led, almost inevitably, to the grouping of qualities into two classes, the 'primary' and the 'secondary.' Primary qualities are those which are supposed to depend upon the object exclusively, such as shape, size and hardness; secondary qualities are those which depend upon the perceiving mind, such as color and taste. Primary qualities, according to this view, exist whether perceived or not; secondary qualities exist only when they are perceived. On this theory sense-perception presents ob-

jects in a way that is partly true and partly false. Our perceptions of the primary qualities are photographic representations of the qualities that belong to objects; whereas our perceptions of secondary qualities are merely symbolic. The latter stand for qualities in the external world but do not reproduce them exactly as they are. As regards secondary qualities our sensations are like blue goggles in that they distort the objects which they represent.

In view, however, of what was said regarding size and shape, it seems that the distinction between primary and secondary qualities is untenable. This traditional distinction may have no other significance than that it enables the scientist to deal with his facts in a quantitative way. Secondary qualities can perhaps be successfully explained in terms of primary qualities, as, e.g., when sound is explained in terms of air-vibrations, as long as we take for granted the objective character of the primary qualities. But if we find reason to doubt the validity of the distinction between primary and secondary qualities, we have less reason to think that the secondary qualities alone depend solely upon the mind. If the distinction must be given up, we may be forced to choose between the view that all qualities depend solely upon the mind and the view that all qualities are in some way inherent in objects.

How the problem involved in the facts of sense-perception is to be solved, it is not the business of logic to inquire. The problem grows directly out of the inquiry into the processes by which our knowledge is built up, but the consideration of the problem must be left to other disciplines, viz., the theory of

knowledge and metaphysics. That knowledge of some sort is possible must be assumed by logic before its inquiry can begin. But reflection upon the methods employed by knowledge cannot avail to ascertain the precise scope of knowledge, or to determine its ability to discover the true nature of the world in which we live.

EXERCISES

NOTE

Many of the following examples have become common property among logicians, and so I have not been at great pains to ascertain who should be credited with them. It is likely also that some of the references here given do not indicate the real origin. The books upon which I have drawn most for material and which are mentioned in an abbreviated form are as follows:

- Aikins, *Principles of Logic* (A).
- Creighton, *Introductory Logic* (C).
- Hibben, *Logic, Inductive and Deductive* (H).
- Jevons, *Lessons in Logic*, and *Studies in Deductive Logic* (J).
- Mellone, *Textbook of Logic* (M).
- Whately, *Elements of Logic* (W).
- Wilson, *Treatise on Logic* (Wilson).

EXERCISES

CHAPTER II

From the following exercises select those terms of which the meaning seems most uncertain, and in each case point out different meanings that are included under the same term. State which of these alternative meanings you think properly belongs to the term in its present context:

1. We should live according to Nature.
2. Life is real, life is earnest.
3. God is truth.
4. The wages of sin is death.
5. All men have natural rights.
6. All men are created free and equal.
7. Our Father, who art in heaven.
8. The world is selfish, and so it cannot accept a gospel of unselfishness.
9. The King can do no wrong.
10. Ours is a government of the people, by the people, and for the people.
11. England's rule of Ireland has been a failure.
12. The proprietor of a circus once claimed that "people like to be humbugged."
13. We should love our neighbors as ourselves, yet everybody loves his immediate relatives more than strangers.
14. The fear of the Lord is the beginning of wisdom.
15. There is nothing either good or bad, but thinking makes it so.
16. A man tries to shoot a squirrel that is clinging to a tree on the side opposite to the man. The man walks

completely around the tree, but the squirrel always keeps the trunk of the tree between itself and the man. Did the man go around the squirrel?

17. Which hen is the mother of the chicken, the one that laid the egg or the one that hatched it out and takes care of it? (A.)

18. No evil should be allowed that good may come of it; all punishment is an evil; therefore no punishment should be allowed that good may come of it.

19. Whatever is dictated by Nature is allowable; devotedness to the pursuit of pleasure in youth, and to that of gain in old age, are dictated by Nature; therefore they are allowable. (W.)

20. Avoid those who cause divisions.

CHAPTER III

1. Improbable events happen almost every day; events which happen almost every day are probable events; therefore improbable events are probable events.

2. The indestructibility of matter is a truth which we are bound to accept quite apart from experimental evidence. It is a necessity of our thinking, for, "It is impossible to think of something becoming nothing, for the same reason that it is impossible to think of nothing becoming something—the reason, namely, that nothing cannot become an object of consciousness. The annihilation of matter is unthinkable for the same reason that the creation of matter is unthinkable." (Spencer, *First Principles*, Part II., Chapter IV.)

3. He who believes himself to be always in the right in his opinion, lays claim to infallibility; you always believe yourself to be in the right in your opinion (for an opinion that you consider wrong is not your opinion); therefore you lay claim to infallibility.

4. No cat has nine tails; one cat has one tail more than no cat; therefore one cat has ten tails.

5. "A gentleman told me that he had a conclusive argument for opening the Harvard Medical School to women. It was this: 'Are not women human?'—which major premise, of course, had to be granted. 'Then are they not entitled to all the rights of humanity?' My friend said that he had never met any one who could successfully meet this reasoning." (James, *Psychology*, Vol. II., p. 674.)

6. Life, God, omnipotent Good, deny death, evil, sin, disease.—Disease, sin, evil, death, deny Good, omnipotent God, Life. Which of the denials . . . is true? Both are not, can not be true." (*Science and Health*, chapter on *Science, Theology, Medicine*.)

7. This stove saves half the ordinary amount of fuel; therefore two such stoves would save it all.

8. He who cannot possibly act otherwise than he does has neither merit nor demerit in his action; a liberal and benevolent man cannot possibly act otherwise than he does in relieving the poor; therefore such a man has neither merit nor demerit in his action.

9. "By virtue of the law that a civilized people absorbs its neighbors who are in intellectual nonage—a law which is as universally valid and as much a law of nature as the law of gravity—the Italian nature was entitled to reduce to subjection the Greek states of the East." (Mommson, *History of Rome*, Book V., Chapter VII.; quoted by Palmer, *Field of Ethics*, p. 27.)

10. In going around the world westward we keep gaining time, and the whole trip would gain us a full day; therefore if we could make the complete journey in twenty-four hours it would really take us no time at all. (A.)

11. "No reason, however, can be given why the general happiness is desirable, except that each person, so far as he believes it to be attainable, desires his own happiness. This, however, being a fact, we have not only all the proof

which the case admits of, but all which it is possible to require, that happiness is a good, that each person's happiness is a good to that person, and the general happiness, therefore, a good to the aggregate of all persons." (Mill, *Utilitarianism*.)

12. Revenge, Robbery, Adultery, Infanticide, etc., have been countenanced by public opinion in several countries; all the crimes we know of are Revenge, Robbery, Adultery, Infanticide, etc.; therefore all the crimes we know of have been countenanced by public opinion in several countries. (W.)

13. I am under an obligation to do it; but he who is obliged has no power of resistance; consequently I have no choice about the matter.

14. A man cannot always be right in his opinions, and therefore we ought continually to distrust our judgments.

15. Try to formulate the divergent notions of force, matter, and motion that are expressed or implied in the following extracts:

"No force without matter—no matter without force. One is no more possible, and no more imaginable by itself than the other. . . . Force and matter are fundamentally the same thing, contemplated from different standpoints. In the material world we know of no example of a particle of matter not endowed with force or working by it. We must further admit on closer investigation, that matter as such could make no impression on our sense-organs or minds; it can only do this by means of the forces united with or at work within it. A piece of lead held in the hand presses on it because of the attractive force of the earth and so produces the idea of weight. . . . Nothing can prove to us the real existence of a force, except the properties, changes and movements, which we become conscious of in matter, and these we call different 'forces' according to the resemblances or differences in such manifestations; any knowledge of them by other ways is im-

possible. . . . Force may be defined as a condition of activity or a motion of matter or of the minutest particles of matter or a capacity thereof; yet more precisely, as an *expression for the reason of a possible or actual movement*. . . .

“Motion must be regarded as an eternal and inseparable property or as a necessary condition of matter. Matter without motion exists no more than matter without force; motion without matter exists as little as force without matter. Nor can motion be deduced from any force, for it is the very essence of force itself, and can therefore have no origin, but must be eternal and in all places. . . . The most solid body owes its condition only to the mutual attractive force of its minutest particles, which continually oscillate or swing round the so-called center of gravity, and without which it would at once fall to pieces. That these particles are never able to attain a condition of relative rest is proved by the universally present force of heat, which is known to be nothing more than a mode of motion and which, since all bodies without exception contain heat, keep these smallest particles or molecules in a state of continual movement. . . . Motion must therefore be regarded as the primal condition or in some measure as the soul of matter.” (Buechner, *Force and Matter*, Chapters on *Force and Matter*, and *Motion*.)

16. In the following passages, which are intended to prove that a lie is never justifiable, distinguish carefully between the different meanings of “truth” and “true,” and substitute for these words wherever they occur:

(a) “Truth is, so to speak, the very substratum of Deity. . . . As there is no God but the true God, so without truth there is and can be no God.”

(b) “As Christ is Truth, those who are in Christ must never violate the truth. . . . This would seem to be explicit enough to shut out the possibility of a justifiable lie.”

(c) “We cannot conceive of God as God, unless we conceive of Him as the true God, and the God of truth.

If there is any falsity in him, he is not the true God. Truth is of God's very nature. To admit in our thought that a lie is of God, is to admit that falsity is in him, or, in other words, that he is a false god."

(d) "A lie is the opposite of truth, and a being who will lie stands opposed to God, who by his very nature cannot lie. Hence he who lies takes a stand, by that very act, in opposition to God. Therefore if it be necessary at any time to lie, it is necessary to desert God and be in hostility to him so long as the necessity for lying continues." (Trumbull, *A Lie Never Justifiable*; quoted by Aikins, *Principles of Logic*, pp. 25, 26.)

17. No one desires evil knowing it to be evil; to do wrong is evil; therefore no one desires to do wrong save through ignorance.

18. Nothing is possible unless all the conditions of its existence are fulfilled; but when all these conditions are present, it actually exists; therefore whatever is possible is actual. (Mellone.)

19. A small boy who was reminded that he had been told to "stop making that noise," replied that he was not making that noise any more, but another just like it. What ambiguity is involved in this reply?

20. 'I may fairly expect that one who has received kindness from me should protect me in distress; yet I may have reason to expect that he will not.' (W.) Explain.

CHAPTER IV

1. Testimony is a kind of evidence that is very likely to be false; the evidence on which most men believe that there are pyramids in Egypt is testimony; therefore the evidence on which most men believe that there are pyramids in Egypt is very likely to be false. (W.)

2. As a thing is generally sold for more than it is worth,

or for less, one of the parties to an exchange commonly is a loser by the transaction. (H.)

3. Man is not created by God, but is the product of Evolution.

4. 'An honest man's the noblest work of God'; Z is an honest man; therefore, he is—what? (Minto.)

5. No soldiers should be brought into the field who are not well qualified to perform their part; none but veterans are well qualified to perform their part; therefore none but veterans should be brought into the field. (W.)

6. "To be up after midnight, and to go to bed then, is early; so that, to go to bed after midnight is to go to bed betimes." (*Twelfth Night*, Act II., Scene 3.)

7. Epimenides, the Cretan, says that "all the Cretans are liars," but Epimenides is himself a Cretan; therefore he is himself a liar. But if he be a liar, what he says is untrue, and consequently the Cretans are veracious; but Epimenides is a Cretan, and therefore what he says is true; hence the Cretans are liars, Epimenides is himself a liar, and what he says is untrue.

8. "It [the sun] moves to the south because of the cold which drives it into the warm parts of the heavens over Libya." (Herodotus; quoted by James, *Varieties of Religious Experience*, p. 496, note.)

9. "Do unto others as you would have others do unto you." If I were unable to answer the questions in an examination, I should want my neighbor to give me assistance; therefore it is my duty to help this man who is having trouble.

10. He who is most hungry eats most; he who eats least is most hungry; therefore he who eats least eats most. (Aldrich.)

11. "What is worth doing at all is worth doing well." Show how this statement must be limited in its application.

12. "We are aware that a considerable number of per-

sons still cling to the punishment of death for murder, on the ground that *murder deserves death*. Murder, they say, is a crime *per se*; it transcends every other offense, not in degree only, but in essential turpitude; and it is therefore *right* that the murderer should be killed. This argument we propose to meet and combat.

“The first answer that we make to the foregoing reasoning is that *mere desert* is not a ground on which it becomes us to punish. Were we all visited “according to our iniquities,” which of us would survive to execute the murderer? He only that is “without sin” has a right to “cast the first stone” at the offender; and who among us can pretend to be in that position? We must recollect that in claiming to punish on the ground of desert, we arraign, not the act, but the motive. Now, which of us would not merit the murderer’s doom if all our motives could be evidenced against us? Is there any human being that has not, at some time or other, entertained an unkind, a revengeful, a malicious, thought towards a fellow-creature? And is not such a thought as essentially and inherently murder as the very act of homicide itself? . . .

“We would inquire, secondly, into the *rationale* of this argument about desert. *Why* does the murderer deserve death? The answer will be, Because he has deliberately taken human life. Then, of course, the same guilt is perpetrated, and the same penalty incurred, when the law deliberately takes human life in return. For wherein is the difference? Both acts of homicide are perpetrated wilfully; and to our mind the homicide of the law is worse than the homicide of the assassin, inasmuch as it is committed in cold blood, and in sight of day. Perhaps it will be replied that the *motive* makes the difference. But what is the motive of the law? Let it be called what it may, vindication of justice, infliction of desert, or what not, it is neither more nor less than an intention to retaliate vengeance on an evildoer. And is this a motive that can be

safely preached by a government to a people? Will an individual refrain from revenge when the state asserts its propriety? If, as is said by political philosophers, governments have no rights, no powers, which are not derived from individual rights and powers, will not an aggrieved individual say, 'What the state may do, *I* may do,' and take vengeance accordingly? We have already shown that men *do* thus reason; and now we have shown that if the law is right, they are justified in doing so.

"Again: it is said that 'the murderer *deserves* death.' For what? For his evil motive. But we cannot *see* motive. The hearts of our fellow-creatures are hidden from us, and we cannot *certainly* ascertain and know even the simplest of their thoughts. We may guess at them; but when we guess at the motives of others, are we not wrong in nineteen cases out of twenty? Before we can be justified in arraigning and punishing motive, we must show that we are able to discern it accurately, and properly estimate its nature and its force. Nor is this all. We must be able to estimate the strength of the temptation, too. The man who is strongly tempted to commit murder, by want, by injuries received, or by great provocation of any other kind, is surely not so worthy of punishment as the man who is actuated by malignant hatred and unwarranted malice. Now it must be plain that we cannot possibly judge in this manner, inasmuch as our faculties are not sufficiently clear and far-sighted; and, such being the case, the endeavor to inflict penalties upon evil motive is a mere hypocritical pretence and mockery, a presumptuous usurpation of the Eternal prerogative." (*Eclectic Review*, July, 1849, pp. 115-7.)

13. In the following three passages select the abstract terms of which the meaning seems doubtful, and replace with concrete terms:

(a) There is no life, truth, intelligence, or substance in matter. All is infinite Mind and its infinite manifestation,

for God is All in all. Spirit is immortal truth; matter is mortal error.

(b) Life is neither in nor of matter. What is termed matter is unknown to Spirit, which involves in itself all Substance, and is Life eternal. Matter is a human concept. Life is divine Mind. Life is not limited. Death and finiteness are unknown to Life.

(c) If Good, or God, is real, then evil, the opposite of God, is unreal. Then evil can only seem real, by giving reality to the unreal. The children of God have but one Mind. How can Good lapse into evil, when God, the Mind of man, never sins? (*Science and Health*, Chapter on *Recapitulation*.)

14. An idle man hates life, for he kills time, and time is the stuff that life is made of.

15. What is the opinion of science expressed in the following lines? Show that they may be interpreted in more than one way:

Books! 'tis a dull and endless strife:
Come, hear the woodland linnet,
How sweet his music! on my life,
There's more of wisdom in it.

Sweet is the lore which Nature brings;
Our meddling intellect
Mis-shapes the beauteous forms of things:—
We murder to dissect.

Enough of Science and of Art;
Close up those barren leaves;
Come forth, and bring with you a heart
That watches and receives.

(Wordsworth, *The Tables Turned*.)

16. The whole is greater than the part; we are capable of wisdom and we are part of the world, therefore the world is capable of wisdom.

17. A story is not to be believed, the reporters of which give contradictory accounts of it; the story of the life and exploits of Bonaparte is of this description; therefore it is not to be believed. (W.)

18. The cause of evil is itself an evil. But that Christianity has caused much evil in the shape of wars, oppression, imposture, fanaticism, and persecution cannot be denied. (Wilson.)

19. Actions that benefit mankind are virtuous; therefore it is a virtuous action to till the ground. (J.)

20. Repentance is a good thing; wicked men abound in repentance; therefore wicked men abound in what is good. (W.)

21. "In a given state of society a certain number of persons . . . must put an end to their own life. This is the general law, and the special question as to who shall commit the crime depends, of course, upon special laws, which, however, in their total action, must obey the large social law to which they are all subordinate. And the power of the larger law is so irresistible that neither the love of life, nor the fear of another world, can avail anything towards even checking its operation." (Buckle, *History of Civilization*, Vol. I., p. 25.)

CHAPTER V

Test by obversion and conversion:

1. When we hear that all the righteous people are happy, it is hard to avoid exclaiming, what! are all the unhappy persons we see to be thought unrighteous?

2. If a man who has been accustomed to enjoy liberty cannot be happy in the condition of a slave, does it follow that a man who has not been accustomed to liberty can be happy as a slave?

3. Generosity is a virtue, therefore selfishness is a vice.

4. In the following arguments restate all propositions containing words like "few," "only," or "none but," so as to indicate the correct quality and quantity, and determine whether the argument is sound or unsound. If unsound, point out the false obversion or conversion that is implied:

(a) Only the virtuous are truly noble; some who are called noble are not virtuous; therefore some who are called noble are not truly noble.

(b) He that is of God heareth God's words; ye therefore hear them not, because ye are not of God. John viii: 47.

(c) Warm countries alone produce wines; Spain is a warm country; therefore Spain produces wines.

(d) None but the wise are good; none but the good are happy; therefore none but the wise are happy.

(e) Few towns in the United Kingdom have more than 300,000 inhabitants; and as all such towns ought to be represented by three members of Parliament, it is evident that few towns ought to have three representatives.

(f) None but the industrious deserve to succeed; I deserve to succeed; therefore I am industrious.

(g) None but the industrious deserve to succeed; I am industrious; therefore I deserve to succeed.

(h) Logic is indeed worthy of being cultivated, if Aristotle is to be regarded as infallible; but he is not; therefore logic is not worthy of being cultivated. (W.)

(i) He who is content with what he has is truly rich; a covetous man is not content with what he has; no covetous man therefore is truly rich. (W.)

(j) Jones must succeed in the world, for he is an honest man, and dishonest people never prosper.

(k) Only those messages which are prepaid will be delivered. This message has been prepaid; and therefore it will be delivered. (H.)

(l) Pious men only are fit to be ministers of religion; some ignorant men are pious; therefore ministers of religion may be ignorant men.

(m) Since the virtuous alone are happy, he must be virtuous if he is happy, and he must be happy if he is virtuous.

(n) None but whites are civilized; the Hindoos are not white; therefore the Hindoos are not civilized.

(o) None but whites are civilized; the ancient Germans were white; therefore they were civilized.

(p) None but civilized people are white; the Gauls were white; therefore they were civilized. (Wilson.)

(q) If some who are very sentimental are nevertheless not benevolent, then some who are not benevolent are sentimental. (Wilson.)

(r) The earth's position must be fixed, if the fixed stars are seen at all times in the same situations; now the fixed stars are not seen at all times in the same situations; therefore the earth's position is not fixed. (J.)

(s) Only animals are sentient beings; fishes are animals; therefore fishes are sentient beings.

CHAPTER VI

Put the following arguments into syllogistic form, placing the major premise first, the minor premise second, and the conclusion last; and test the validity of the inference by circles. Name the figure of the syllogism, and if the inference is invalid, give the name of the fallacy. Point out the error in quality or quantity to which the fallacy is due:

1. All A is B; no A is C; therefore no C is B.
2. No A is C; all B is C; therefore no A is B.
3. Some A is B; some C is not B; therefore some A is not C.

4. Some A is B; some A is not C; therefore some B is not C.

5. All A is C; some B is not A; therefore some B is not C.

6. Quibbling is not necessarily a case of sophistry; for quibbling may be unintentional, while sophistry always implies the intention to deceive.

7. Honesty is not always the best policy; for honesty sometimes means starvation, and what ends in starvation is certainly not the best policy.

8. The radical is not always a man of lofty motives; your mere malcontent, for example, is often rather a selfish being, and every malcontent is of course a radical.

9. It does not follow that a stickler for truth-telling need be narrow and severe; Quakers, for example, make a great point of telling the exact and literal truth, and they are often charitable enough. (Sidgwick, *Fallacies*, p. 242.)

10. Some white men have become Presidents; no negroes have become Presidents; therefore no negroes are white men.

11. It is not true that a man cannot do a great work without a strong physique; for the philosopher Kant did a great work and his physique was anything but strong. (A.)

12. No one is free who is enslaved by his appetites; the sensualist is enslaved by his appetites; therefore no sensualist is free.

13. That man is independent of the caprices of Fortune who places his chief happiness in moral and intellectual excellence. A true philosopher is independent of the caprices of Fortune; therefore a true philosopher is one who places his chief happiness in moral and intellectual excellence.

14. No men are thoroughly unselfish; some women are; therefore some men at least are not women. (A.)

15. These men give alms; no thieves give alms; therefore these men are not thieves.

16. Some men are not fools; all men are fallible; therefore—what?

17. All cruel men are cowards; no college men are cruel; therefore no college men are cowards.

18. Whatever is given on the evidence of the senses is a fact; the existence of God, therefore, is not a fact, for it is not evident to sense.

19. No immoral doctrine should be tolerated; this doctrine is not immoral; therefore it may be tolerated.

20. Free Trade is a great boon to the workingman; for it increases trade, and this cheapens articles of ordinary consumption; this gives a greater purchasing power to money, which is equivalent to a rise in real wages, and any rise in real wages is a boon to the workingman. (C.)

21. Protection from punishment is plainly due to the innocent; therefore, as you maintain that this person ought not be punished, it appears that you are convinced of his innocence. (W.)

22. The use of ardent spirits should be prohibited by law, seeing that it causes misery and crime, which it is one of the chief ends of law to prevent. (J.)

23. An avaricious man is one who desires more than he possesses; a man who desires more than he possesses is discontented; a discontented man is unhappy; therefore an avaricious man is unhappy. (M.)

24. “He that accepts protection stipulates obedience”; we have always protected the Americans; we may therefore subject them to government.

“The less is included in the greater. That power which can take away life may seize upon property. The parliament may enact for America a law of capital punishment; it may therefore establish a mode and proportion of taxation.” (Dr. Samuel Johnson, *The Patriot*.)

25. “He that denies the English Parliament the right to

taxation, denies it likewise the right of making any other laws, civil or criminal; yet this power over the colonies was never yet disputed by themselves. They have always admitted statutes for the punishment of offenses, and for the redress or prevention of inconveniences; and the reception of any law draws after it, by a chain which cannot be broken, the unwelcome necessity of submitting to taxation." (Johnson, *Taxation no Tyranny*.)

26. The child of Themistocles governed his mother; she governed her husband; he governed Athens; Athens, Greece; and Greece the world; therefore the child of Themistocles governed the world.

27. It sometimes happens that worthy pursuits do not conduce to material gain, for certainly philosophical studies deserve to be pursued, and yet they often bring no pecuniary reward. (M.)

28. Every one desires happiness; virtue is happiness; therefore every one desires virtue.

29. Whenever it is impossible not to sin, it is unjust to punish. Now it is always impossible not to sin, for all that is predetermined is necessary, and all that is foreseen is predetermined, and every event is foreseen. Hence it is always unjust to punish. (Leibniz.)

30. A and B are both equal to C; hence they are equal to each other.

31. Only those actions which contribute to the welfare of man are virtuous; therefore, since this action contributes to the welfare of man, it must be virtuous.

CHAPTER VII

Determine whether the following arguments belong to the type of the hypothetical syllogism, the disjunctive syllogism, or the dilemma; put the reasoning into proper syllogistic form wherever necessary, and judge of its valid-

ity. If the argument is found to be valid but not true, point out the error in the premises:

1. If the earth were of equal density throughout, it would be about $2\frac{1}{2}$ times as dense as water; but it is about $5\frac{1}{2}$ times as dense; therefore the earth must be of unequal density. (J.)

2. If fire may be separated from a flint, a property may be separated from its subject; but fire cannot be separated from the flint; therefore a property cannot be separated from its subject. (Wilson.)

3. In order to move, a body must move either in the place where it is, or in the place where it is not. But it cannot move in the place where it is, since that place is already occupied. Neither can it move in the place where it is not. Motion is therefore impossible.

4. If peace at any price is desirable, war is an evil; and as war is confessedly an evil, peace at any price is desirable. (J.)

5. If all men were capable of perfection, some would have attained it; but none having done so, none are capable of it. (M.)

6. "If he has not studied, he will fail in the examination." With this proposition as a major premise, what can be inferred if we take as minor premise:

(a) He has not studied.

(b) He will fail.

(c) He will not fail.

(d) He has studied.

7. If men are not likely to be influenced in the performance of a known duty by taking an oath to perform it, the oaths commonly administered are superfluous; if they are likely to be so influenced, every one should be made to take an oath to behave rightly throughout his life. But one or the other of these must be the case; therefore either the oaths commonly administered are superfluous, or every

man should be made to take an oath to behave rightly throughout his life. (W.)

8. According to the story related of Protagoras and Euathlus, "the former undertook to teach the latter the art of pleading, and payment was to be by results. When Euathlus won his first cause he was to pay Protagoras an honorarium. It happened, however, that he disliked the dusty atmosphere of the law, and cheated Protagoras of his fee by refusing to become a pleader. Whereupon Protagoras sued him, considering that should the court award the money to himself it would be his; while even if the court gave a verdict for Euathlus he would still have the money, which Euathlus would then be bound to pay to him in virtue of the agreement. He triumphantly told Euathlus that he would have to pay in either case. But Euathlus said, No. If I win this cause, the judges will have decided that I need not pay the money. If I lose it, I shall have no obligation under our agreement to pay." (MacLeane, *Reason, Thought and Language*, p. 470.) Discuss this.

9. Protective laws should be abolished, for they are injurious if they produce scarcity, and they are useless if they do not. (J.)

10. If transportation is not felt as a severe punishment it is in itself ill suited to the prevention of crime; if it is so felt, much of its severity is wasted, from its taking place at too great a distance to affect the feelings, or even come to the knowledge, of most of those whom it is designed to deter; but one or other of these must be the case; therefore transportation is not calculated to answer the purpose of preventing crime. (W.)

11. When the Caliph Omar burned the Alexandrian library, he is said to have justified himself by saying that if the books in the library contained the same doctrines as the Koran, they were unnecessary, while if they contained doctrines at variance with the Koran they were

evil; and since one or the other must be true, the books were either unnecessary or evil.

12. If education is popular, compulsion is unnecessary; if unpopular, compulsion will not be tolerated. (J.)

13. No honest man can advocate a change in the creed of his church; for he must either believe it or not believe it, and if he believes it he cannot honestly help to change it, while if he does not believe it he cannot honestly belong to the church at all. (A.)

14. "An abundant stream divides two limits of one property . . . and over this stream stood a bridge; and at the head of it a gallows, over which were appointed four judges to decide according to the law established by the lord of the stream, the bridge and the territory. The law ran in this wise: 'If any one shall pass over this bridge from one side to the other, he must first swear as to whence he comes and on what business he is bound, and if he swear truly he must be allowed to go; but if he swear falsely he shall on that account die by hanging on the gallows which is there; and that without remission whatever.' This law and its stern conditions being known, many went over; and as soon as it was perceived that they swore truly, the judges allowed them to pass freely. It happened, however, that on swearing one man, he took the oath and declared that he was going to die on that gallows, and that he had no other business. The judges consulted the terms of the oath, and said: 'If we allow that man to go free, he has sworn falsely, and according to the law he ought to die; and if we hang him, the oath that he was going to hang on that gallows was true, and according to the same law he ought to be free.'" (From *Don Quixote*, quoted by Lafleur, *Illustrations of Logic*, No. 216.) Is there any way out of this dilemma?

15. "This is either A or B; it is not B; therefore it is A." In a similar way we may reason: It is either raining or not raining; it is not raining; therefore it is raining.

CHAPTER VIII

Complete the following arguments and state in correct syllogistic form:

1. Blessed are the meek, for they shall inherit the earth.
2. This man does not have a good record in his studies, and is therefore not eligible.
3. A dog is not rational, for he is not human.
4. He must be a strong man, for he is on the crew.
5. He must be a lawyer, for none but lawyers are admitted.
6. Some insane people are clever, for some geniuses are insane.
7. He is not a gentleman, for no gentleman would do such a thing.
8. A military man may become President, for Grant became President.
9. Only the good are fit to die, therefore capital punishment is wrong.
10. You must have come on business, for the card says, "None admitted except on business."
11. Discuss the following arguments, point out the tacit assumptions wherever they occur, and consider whether the assumption is permissible. Put the argument into syllogistic form wherever this may readily be done:
 - (a) "We are not inclined to ascribe much practical value to that analysis of the inductive method which Bacon has given in the second book of the *Novum Organum*. It is, indeed, an elaborate and correct analysis. But it is an analysis of that which we are all doing from morning to night, and which we continue to do even in our dreams." (Macaulay.)
 - (b) A classical education is worthless, for we make no use of the ancient languages in later life.

- (c) For forms of government let fools contest;
Whate'er is best administered is best;
For modes of faith let graceless zealots fight;
His can't be wrong whose life is in the right.

(Pope, *Essay on Man*, Epistle III.,

(d) Written examinations are not an absolutely fair test of a student's scholarship—much less of his industry and intelligence. It is therefore wrong to base his grade upon them. (A.)

(e) "An opinion as to the constitutionality of the licensed saloon:

"The preamble to the Constitution of the United States is:

"We, the people of the United States, in order to form a more perfect union, to establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America."

"I am not able to find that a more perfect union was ever formed or justice established by the aid of the saloon.

"Not a single case of domestic tranquillity that this institution has insured appears.

"The common defense has not been provided for, nor the general welfare promoted.

"The blessings of liberty are endangered rather than secured.

"I find the saloon has absolutely and completely failed to promote the intent and purpose of our fundamental law and I therefore declare that, in my opinion, the saloon is unconstitutional, is a menace to the public health and safety and has no right as a government-protected institution to exist.

"If allowed to operate it will jeopardize the very life of the republic.

"If this opinion is sustained by the voters the licensed saloon must cease to be. Will you help?"

(f) If it is fated that you die, you will die whether you call in a doctor or not, and if it is fated that you will recover, you will recover whether you call in a doctor or not. But it must be fated either that you die or that you recover. Therefore, you will either die or recover, whether you call in a doctor or not.

(g) Slavery is an outrage upon the inalienable rights of man. It operates, wherever it exists, as a means of corruption and degeneracy to the social and political condition of mankind. Hence, as citizens, as Christians, and as philanthropists, we are called upon to labor for the promotion of its immediate abolition. (Wilson.)

(h) I have shown, gentlemen, that it is the natural right of all God's creatures to be free. I have shown that a people having the same tongue, historic recollections, and associations, conveniently situated, and existing in sufficient numbers for the purpose, are entitled to a distinct national existence; and I claim, therefore, not only the sympathy of Americans for my poor and oppressed Hungary, which I know that I shall have, but also their intervention as a nation, and their generous liberality in furnishing the material aid necessary to enable us to carry on our struggle, and secure our independence of Austrian rule and despotism. (Wilson.)

(i) "That they who form a settlement by a lawful charter, having committed no crime, forfeit no privileges, will be readily confessed; but what they do not forfeit by any judicial sentence, they may lose by natural effects. As a man can be in but one place at once, he cannot have the advantages of multiplied residence. He that will enjoy the brightness of sunshine must quit the coolness of the shade. He who goes voluntarily to America, cannot complain of losing what he leaves in Europe. He perhaps had a right to vote for a knight or burgess; by crossing

the Atlantic he has not nullified his right; but he has made its exertion no longer possible. By his own choice he has left a country where he had a vote and little property for another where he has great property, but no vote. But as this preference was deliberate and unconstrained, he is still *concerned in the government of himself*; he has reduced himself from a voter to one of the innumerable multitude that have no vote. He has, truly *ceded his right*, but he still is governed by his own consent." (Johnson, *Taxation no Tyranny*.)

(j) "The railroads have usually acted upon the apparent assumption that it is none of the public's business whether they are overcapitalized or not. It remained for the counsel for the N. and N. railroad, a road notorious for its stock watering operations, publicly to declare—in the form of a question, it is true, but none the less bluntly—the railroad position. If the N. and N. 'charges reasonable rates,' demands its counsel, 'what is it to the public whether its capitalization be high or low?'" (From an editorial.) What assumption is involved in this question?

(k) Whoever refuses to believe in the inspiration of the Bible makes the Most High a deceiver; for has he not told us that 'All Scripture is given by inspiration of God'?

(l) "As to falsifying to a sick or dying man, he [Dorner] says 'we over-estimate the value of human life, and, besides, in a measure usurp the place of Providence, when we believe we may save it by committing sin.'"

"It is a physician's duty to conceal from a patient his sense of the grave dangers disclosed to his professional eye, and which he is endeavoring to meet successfully. And in well-nigh every case it is possible for him to give truthful answers that will conceal from the patient what he ought to conceal; for the best physicians do not know the future, and his professional guesses are not to be put forward as if they were assured certitudes." (From Trumbull's *Lie Never Justifiable*; quoted by Aikins, p. 471.)

(m) From an argument against prohibition: "In less than a decade the whole face of the world is changed. It is now a sort of treason to challenge any dogmas of social policy that have obtained a large following, especially if they plead morality and the interests of the workingman as their justification. . . . The teetotalers have increased in number and in power so largely that newspapers are afraid to offend them. In these matters and in others we have lost our reason. The world is a *mêlée* of special constables, each bent upon getting his own fad enforced at the point of the truncheon. The police magistrate flogs the children to school. The law is invoked to take away the grocers' wine and beer licenses, and otherwise to interfere with the supply of what is as much a necessary of civilized life as tea; and the scholar at his desk begins to fear that the law will shortly declare that he must not read Athenæus, Swedenborg, or Goethe, and will kindly send the policeman to expurgate his library for him. . . . It never seems to occur to these intrusive persons that it is they who are the sinners. . . . The rights of divergent opinions? Justice? Those things are obsolescent." (*Contemp. Review*, Vol. 30, p. 455.)

(n) Summary of an argument on the question, Is Prohibition a wise policy:

"There exists, then, a business in this country which can be carried on only by men whose moral character is at least so low that they cannot be expected to obey the law; a business which injures the country more than the most stringent prohibition of imports, or the most unrestricted free trade could; a business which produces more distress, destroys more property, happiness, and life, than all other things known; a business which injures the country every year more than our civil war did in four years; a business that produces four-fifths of all the robberies, thefts, murders, and other crimes in the land; a business which does the nation and the world more harm than war,

famine, and pestilence combined; a business which stands against all material, intellectual, and spiritual progress.

"I am asked whether the policy of making that business criminal is wise? Most assuredly, yes. If that be not true, where is the wisdom of prohibiting anything?" (*North American Review*, Vol. 147, p. 149.)

(o) "The punishment of death is unquestionably the most powerful deterrent, the most effectual preventive, that can be applied. Human nature teaches this fact. An instinct that outruns all reasoning, a dreadful horror that overcomes all other sentiments, works in us all when we contemplate it. . . .

"It has been found, by the experience of many nations and many ages, that death alone impressed the imagination of the people, and alone carried so vivid a horror, as to check the malignant passions and the deadly hand of the murderer.

"It has been sometimes objected that the facts do not bear out this assertion; that where the capital penalty was abolished, the crime of murder did not increase; that as its abolition in England as a punishment for theft and other lesser crimes did not result in an increase of those, the same is found to be the consequence of total abolition. The space allowed me here does not permit a discussion of the statistics collected on this question. Suffice it to say, that the results, as shown from the reliable records, do not sustain so paradoxical a proposition. It would be in direct contradiction to the ineradicable instincts of humanity if it were so. The loss of life is universally and instinctively dreaded beyond all other calamities by all classes of men—the rich and poor, the upright and vicious, the learned and ignorant alike; it is incredible that its certain infliction as the inevitable consequence of an illegal act would not have the supremest influence in preventing that act." (*North American Review*, Vol. 150, p. 545-6.)

(p) I will not do this act, because it is unjust; I know

that it is unjust, because my conscience tells me so, and my conscience tells me so, because the act is wrong. (Fowler.)

(q) "Mr. Gladstone, however, commits himself to the principle that 'all protection is morally bad.' If this has been his belief ever since he became an advocate of free trade, his conscience must have received many and severe wounds, as session after session, while Chancellor of the Exchequer, he carried through Parliament a bounty—may I not say a direct protection?—of £180,000 to a line of steamers running between England and the United States—a protection that began six years before free trade was proclaimed, and was continued nearly twenty years after." (*North American Review*, January, 1890; quoted by Hyslop, p. 395.)

CHAPTER X

Analyze the following arguments, in order to determine the method involved, and to discover, if possible, ground for a "reasonable" doubt:

1. Any one who examines the records will soon find out for himself that those students who "scatter" most in their choice of studies are those who accomplish least in any of them; and when he sees this he ought to realize the harm that can be done by a system of absolutely free electives. (A.)

2. "Our correspondent should find solace in the thought that vaccination, while giving no protection, may leave in its trail consumption, scrofula, cancer and other unexpected things, which very things bring additional business for certain doctors. These vaccinators are not so prehistoric as they may appear." (*Life*, June 11, 1908.) In what way would this statement have to be proved?

3. "It does not follow that an institution is good because a country has prospered under it, nor bad because a coun-

try in which it exists is not prosperous. It does not even follow that institutions to be found in all prosperous countries, and not to be found in backward countries, are therefore beneficial. For this at various times might confidently have been asserted of slavery, of polygamy, of aristocracy, of established churches; and it may still be asserted of public debts, of private property in land, of pauperism, and of the existence of distinctly vicious or criminal classes." (Henry George, quoted by Creighton, p. 377.) What seems to be the correct inference?

4. "In Sweden the population and the smallpox mortality have both been known year by year since 1774. Before vaccination the mortality from smallpox for thirty years averaged 2,045 per million. With permissive vaccination from 1802 to 1816 it was reduced to 480; during seventy-seven years of compulsory vaccination the mortality averaged 155 per million; and for ten years ending 1894 it has been down to 2 per million. . . .

"If we compare the rate of smallpox mortality in the different countries, we see an enormous difference between the well vaccinated and the badly vaccinated populations. Here is a table, given by Dr. Edwardes, of the mortality rates per million in the five years 1889 to 1893:

	Smallpox mortality per million.
Germany	2.3
England and Wales.....	13.6
Chief French towns.....	147.6
Italy	180.8
Belgium	253
Austria	313
Spain	638
Russia, 3 years only, including	
Asiatic Russia	836

In Germany, vaccination and revaccination are both compulsory. In the other countries revaccination was, at that

time at least, nowhere enforced." (*Edinburgh Review*, Vol. 189, pp. 350-2.)

5.

HOW TO NAME CHILDREN

There are some things which we cannot reason out. Science fails to disclose the reason why the cyclone, in its semi-elliptical whirl moves from the right to the left in the Northern hemisphere, and from the left to the right in the Southern half of the globe; and so, too, some unknown force directs the spiral course of the creeping vine. May there not be some subtle forces directing the fate of men? Do natural laws govern only the movement of the winds or the growth of plants? May not a name bestowed upon the helpless infant produce effects, and become "One of the few, the immortal names that were not born to die"?

Our first parents and the prominent persons spoken of in Holy Writ seem to have had but one name: Adam, Eve, Cain, Abel, Moses, Aaron, and Joshua. But, passing without notice the intervening ages and coming down to our own times and confining ourselves particularly to our own country, if we examine the names of our great men we will be surprised at the preponderance of single-named (meaning but one name in addition to the surname) persons.

Let us go to the Revolution. Take the signers of the Declaration of Independence. First, we find a committee to draft it. They were Jefferson, Adams, Franklin, Sherman, and Livingston. None of these had middle names except Livingston. Of those who signed the Declaration, on the part of the States, . . . there were only three who had more than one name.

"In 1786 there was a commercial convention called to meet at Annapolis to consider the commercial relations of New York, Delaware, New Jersey, Pennsylvania, and Virginia. Not a solitary delegate to that convention had a middle name.

"In 1787 a convention was held to revise the Constitution, and out of the fifty-six delegates to this convention there were only five with more than one name.

"Of the forty-eight who signed the Articles of Confederation on the ninth of July, 1788, only four had more than one name. Of the thirty-six speakers of the House during the first half century of the nation's existence, only twelve had more than one name. Of the five Chief Justices during the same period none had more than one name. . . . Of the thirty-one Associate Justices during the same period only five had more than one name. Of the eighteen Secretaries of State only two had middle names; of the eighteen Secretaries of the Treasury only eight. Of the twenty-six Secretaries of War, only nine; of the twenty-one Secretaries of the Navy, only eight.

"We have had twenty-two Presidents during our national existence. Washington, Adams, Jefferson, Madison, Monroe, Jackson, Van Buren, Tyler, Fillmore, Pierce, Buchanan, Lincoln, Johnson, and Cleveland all entered into office without the unnecessary luggage of a middle name. These sum up fifteen out of the twenty-two, and all the 'two-termers' are in the list except one (U. S. Grant). . . .

"Is there not something in a name? Must not there be some influence, which we know not of, which, under the operation of cause and effect, produces such results as are cited above? It is true that there are instances of great men whose names are long and whose achievements are famous, but are they not few compared with the number of great men with single names?" (*North American Review*, Vol. 146, p. 580-1.)

6. "It can easily be proved that epidemics of smallpox come and go like all other epidemics, and that neither in intensity nor in duration were they more formidable centuries ago than they have been since the use of vaccine virus was introduced into the medical art. The annals of Iceland show that hundreds of years before vaccination

was heard of, that island was wont to enjoy intervals of exemption from the scourge—intervals of several decades in succession. If modern communities have similar intervals of exemption, it is a fallacy to credit their good fortune to the practice of vaccination." (*North American Review*, Vol. 134, p. 163.) Against what fallacy is this last sentence intended as a warning?

7. "The most generally received theory [as to the origin of animal coloration] undoubtedly is that brilliancy and variety of color are due to the direct action of light and heat; a theory no doubt derived from the abundance of bright-colored birds, insects, and flowers which are brought from tropical regions. There are, however, two strong arguments against this theory. . . . Bright coloration is wanting in desert animals, yet here heat and light are both at a maximum, and if these alone were the agents in the production of color, desert animals should be the most brilliant. Again, all naturalists who have lived in tropical regions know that the proportion of bright to dull-colored species is little if any greater there than in the temperate zone, while there are many tropical groups in which bright colors are almost entirely unknown. . . . Again, there are many families of birds which spread over the whole world, temperate and tropical, and among these the tropical species rarely present any exceptional brilliancy of color. . . . The same general facts are found to prevail among insects. Although tropical insects present some of the most gorgeous coloration in the whole realm of nature, yet there are thousands and tens of thousands of species which are as dull colored as any in our cloudy land. . . . The various facts which have now been briefly noticed are sufficient to indicate that the light and heat of the sun are not the direct causes of the colors of animals, although they may favor the production of color, when, as in tropical regions, the persistent high temperature favors the development of the maximum of life." (Wallace, *Darwinism*, pp. 193-5, quoted by Welton,

Logical Bases of Education, p. 277.) Consider this argument from the point of view of the Methods.

8. We all drank the water and none of us got sick; so this outcry about the danger of typhoid is all nonsense. (A.)

9. "Innumerable statistics have been brought forward by those favorable to the law [of Prohibition, in Kansas], to prove that it has had a most beneficial effect on the social and moral condition of the people. But it is an open question how far the small amount of poverty in the State and the reduction of crime are due to prohibition. I have no wish to minimize the actual good accomplished by the law, but it can serve no useful end to claim for it benefits that are produced by other causes. Kansas is a new settlement, and its surroundings and circumstances are such that we might naturally expect its people to be comparatively free from poverty and its allied evils. The problems that menace the older civilizations of the East, overcrowding, starvation wages, and lack of employment, are hardly felt there, and it is not fair to claim as the outcome of one law the results that are due to many causes. . . .

"One charge has repeatedly been brought against the law in this State—that it has checked the inflow of population. 'The hour that ushered in prohibition,' said the Democratic candidate for the Governorship, 'closed our gates to the hardy immigrant, the home-seeker, the strong and sturdy class that develops a country. . . . It has driven law-abiding and enterprising citizens from the State.' Statistics certainly show a decrease in the population within the last few years. There was a great inflow of immigrants from 1870 to 1880, and from 1880 to 1888 there was a further increase of the population of from less than a million to over a million and a half. But from 1888 to 1890 there was a decrease of about ninety thousand. . . . Since 1890 the number of inhabitants has probably been stationary.

The decrease in recent years, however, has been due, not to any State law, but principally to the fact that great tracts of Indian territory immediately below Kansas have been opened up to white men, and there has been a rush to them. When the reduction is allowed for, Kansas shows a greater increase in population from 1880 to 1890 than many of the principal Western States in which drinking is licensed." (McKenzie, *Sober by Act of Parliament*, pp. 50-52.) What is the fallacy that is brought out in this passage?

10. It was a general belief at St. Kilda that the arrival of a ship gave all the inhabitants colds. Dr. John Campbell took pains to ascertain the fact and to explain it as the effect of effluvia arising from human bodies; it was discovered, however, that the situation of St. Kilda renders a northeast wind indispensably necessary before a ship can make a landing. (H.)

11. Compare the following two sets of statistics. Can you suggest any way in which the discrepancy may be explained?

(a) "The report of the collective investigation committee of the British Medical Association, on the subject of 'Temperance and Health,' and the results embodied in it, are both interesting and important.

"A schedule of inquiries was forwarded to all members of the British Medical Association, one hundred and seventy-eight of whom responded, and gave in the aggregate particulars regarding four thousand two hundred and thirty-four cases of deceased lives, aged twenty-five and upward, in which the alcoholic habits of the lives were recorded. For the purposes of the investigation, the habits of the deceased with reference to alcohol were divided into five classes, namely: (a) total abstainers; (b) habitually temperate; (c) careless drinkers; (d) free drinkers; (e) decidedly intemperate. The ages of death of those in each class were registered, together with the causes of death;

and the average of death for each class is given in the following schedule:

Total abstainers	51.22 years
Habitually temperate drinkers.	63.13 "
Careless drinkers	59.67 "
Free drinkers	57.59 "
Decidedly intemperate drinkers.	53.03 "

(Quoted in the *Arena*, Vol. 8, pp. 209-210.)

(b) "As to the relative healthfulness of temperance or drink the tables yearly made up by the United Kingdom Temperance and General Provident Institution for Mutual Life Insurance (established 1840) afford conclusive practical evidence. The secretary of this institution, Mr. Thomas Cash, kindly furnished me with the following condensed but lucid statement:

	Temperance Section.		General Section.	
	Expected Claims.	Actual.	Expected Claims.	Actual.
1866-70 (five years) ..	549	411	1008	944
1871-75 (five years) ..	723	511	1268	1330
1876-80 (five years) ..	933	651	1485	1480
1881-82 (two years) ..	439	288	647	585
<hr/>				
Total (17 years) ...	2644	1861	4408	4339

"It will be seen from this that the claims in the temperance section are only a little over seventy per cent. of the expectancy, while in the general section they are but slightly below expectancy." (Axel Gustafson, *The Foundation of Death*, p. 268.)

12. "On the eve of the War of 1812, Congress guarded the national strength by enacting a highly protective tariff. By its own terms this tariff must end with the war. When the new tariff was to be formed, a popular cry arose against 'war duties,' though the country had prospered under them

despite the exhausting effect of the struggle with Great Britain. But the prayer of the people was answered, and the war duties were dropped from the tariff of 1816. The business of the country was speedily prostrated. The people were soon reduced to as great distress as in that melancholy period between the close of the Revolutionary War and the organization of the National Government—1783 to 1789. . . .

“Relief came at last with the enactment of the protective tariff of 1824, to the support of which leading men of both parties patriotically united for the common good. That act, supplemented by the act of 1828, brought genuine prosperity to the country. The credit of passing the two protective acts was not due to one party alone. It was the work of the great men of both parties. . . . We have their concurrent testimony that the seven years preceding the enactment of the protective tariff of 1824 were the most discouraging which the young Republic in its brief life had encountered, and that the seven years which followed its enactment were beyond precedent the most prosperous and happy.

“Sectional jealousy and partisan zeal could not endure the great development of manufactures in the North and East which followed the apparently firm establishment of the protective policy. The free-trade leaders of the South believed—at least they persuaded others to believe—that the manufacturing States were prospering at the expense of the planting States. . . . Out of this strange complication came, not unnaturally, the sacrifice of the protective tariff of 1824-8 and the substitution of the compromise tariff of 1833, which established an *ad valorem* duty of 20 per cent. on all imports, and reduced the excess over that by a 10 per cent. annual sliding scale for the ensuing ten years. . . .

“For a time satisfaction was felt with the tariff adjustment of 1833, because it was regarded as at least a temporary reconciliation between two sections of the Union. Be-

fore the sliding scale was ruinously advanced, there was great stimulus to manufacturing and to trade, which finally assumed the form of dangerous speculation. The years 1834, 1835, and 1836 were distinguished for all manner of business hazard, and before the fourth year opened, the 30 per cent. reduction (three years of 10 per cent. each) on the scale of duties was beginning to influence trade unfavorably. The apprehension of evil soon became general, the panic of 1837 ensued, and business reversals were rapid, general, and devastating. . . . There was no relief to the people until the protective tariff of 1842 was enacted; and then the beneficent experience of 1824 was repeated on even a more extensive scale. Prosperity, wide and general, was at once restored. But the reinstatement of the Democratic party to power, two years later, by the election of Mr. Polk to the Presidency, followed by a perverse violation of public pledges on the part of men in important places of administration, led to the repeal of the protective act and the substitution of the [disastrous free-trade] tariff of 1846. . . . If these disasters of 1857, flowing from the free-trade tariff, could have been regarded as exceptional, if they had been without parallel or precedent, they might not have had so deadly a significance. But [as has been shown] the American people had twice before passed through a similar experience. . . .

“Measuring, therefore, from 1812, when a protective tariff was enacted to give strength and stability to the government in the approaching war with Great Britain, to 1861, when a protective tariff was enacted to give strength and stability to the government in the impending revolt of the Southern States, we have fifty years of suggestive experience in the history of the Republic. During this long period free-trade tariffs were thrice followed by industrial stagnation, by financial embarrassment, by distress among all classes dependent for subsistence upon their own labor. Thrice were these burdens removed by the enactment of a

protective tariff. Thrice the protective tariff promptly led to industrial activity, to financial ease, to prosperity among the people. And this happy condition lasted in each case, with no diminution of its beneficent influence, until illegitimate political combinations, having their origin in personal and sectional aims, precipitated another era of free trade. A perfectly impartial man, unswerved by the excitement which this question engenders in popular discussion, might safely be asked if the half-century's experience, with its three trials of both systems, did not establish the wisdom of protection in the United States. If the inductive method of reasoning may be trusted, we certainly have a logical basis of conclusion in the facts here detailed.

“As an offset to the charge that free-trade tariffs have always ended in panics and long periods of financial distress, the advocates of free trade point to the fact that a financial panic of great severity fell upon the country in 1873, when the protective tariff of 1861 was in full force, and that, therefore, panic and distress follow periods of protection as well as periods of free trade. It is true that a financial panic occurred in 1873, and its existence would blunt the force of my argument if there were not an imperatively truthful way of accounting for it as a distinct result from entirely distinct causes. The panic of 1873 was widely different in its true origin from those which I have been exposing. The Civil War, which closed in 1865, had sacrificed on both sides a vast amount of property . . . The situation was without parallel. The speculative mania which always accompanies war had swollen private obligations to a perilous extent. . . . And, strongest of all points, the financial distress was relieved and prosperity restored under protection, whereas the ruinous effects of panics under free trade have never been removed except by resort to protection. . . . Viewing the country from 1861 to 1889—full twenty-eight years—the longest undisturbed period in which either protection or free trade has been tried in this

country, I ask if a parallel can be found to the material advancement of the United States." (J. G. Blaine, *North American Review*, Vol. 150, pp. 33-9.) (One sentence has been transposed.)

13. "The drink question makes an easy and natural fulcrum from which to work a number of levers of the pseudo-philanthropic order. The wrong and pain which stand in visible connection with the excessive use of intoxicants are only too obvious. Any judge, any magistrate, any policeman, any district visitor can speak to them. And when one begins, all the rest follow like sheep. Some Recorder of Cindertown, or some Deputy-Assistant-Judge, remarks that half the crimes of violence that come under his notice in his judicial capacity are traceable to drink—this profound observation is reported in a hundred newspapers—and within a twelvemonth all the judges in the kingdom are echoing the Recorder of Cindertown. The learned gentleman gets his social science cheap. Anybody can see that a bad man of a certain quality must be made worse by half-a-pint of bad gin, or even good gin; but it is not everybody who will pause to reflect that the learned gentleman might just as truly remark that in half the cases of crimes of violence that came under his notice the offenders wore dirty linen, and never brushed their teeth; and that in the other half the culprits were subject to chronic dyspepsia, and never read Milton's 'Comus.' Then the remedy for all this misery seems easy. The murderer or the wife-beater did this under the influence of gin—that is the first step. He bought his gin at the 'Pig and Whistle'—that is the second step. The third step is plain to the meanest capacity—shut up the 'Pig and Whistle,' and there is an end of murder. Add to this that the rates will be greatly reduced, being careful to say nothing of the expenditure that will have to be incurred in carrying out your new law, and you have full-blown social science for Mrs. Nickleby *in excelsis*. And you supply a fine fulcrum in public dis-

cussion for other philanthropic crotcheteers, as indifferent as you are to the rights of the blameless classes of the community, and bent, as you are, upon sacrificing these to the wretched, all-but-worthless minority whom the turn of a feather's weight pushes over into cruel and filthy violence. Now, I protest against this." (*Contemporary Review*, Vol. 30, pp. 457-8.)

14. "Five years ago a first-class pair of nickel-plated steel skates, with the necessary clamps to fasten them to the boot or shoe, cost \$15. To-day precisely the same article, and with an equal finish and completeness, can be obtained for \$4. Three years ago a second grade of nickel-plated steel skates cost \$4. The same article can be produced to-day for \$1.50. The decline of seventy per cent. in five years, and of sixty per cent. in three years, shows just how protection cheapens prices." (*Milwaukee Evening Wisconsin*, quoted by Hyslop, *Elements of Logic*.)

CHAPTER XI

Determine the nature of the following arguments and judge of their validity:

1. "We should think it a sin and a shame if a great steamer, dashing across the ocean, were not brought to a stop at a signal of distress from the mere smack. . . . And yet a miner is entombed alive, a painter falls from a scaffold, a brakeman is crushed in coupling cars, a merchant fails, falls ill, and dies, and organized society leaves widow and child to bitter want or degrading alms." (*Henry George, Protection and Free Trade*, from Creighton, p. 377.)

2. "The missionary [Dr. Livingstone] was trying to dissuade the savage from his fetichistic ways of invoking rain. 'You see,' said he, 'that after all your operations, sometimes it rains and sometimes it does not, exactly as when you have not operated at all.' 'But,' replied the sorcerer,

'it is just the same with you doctors; you give your remedies, and sometimes the patient gets well and sometimes he dies, just as when you do nothing at all.' To that the pious missionary replied: 'The doctor does his duty, after which God performs the cure if it pleases Him.' 'Well,' rejoined the savage, 'it is just so with me. I do what is necessary to procure rain, after which God sends it or withholds it according to His pleasure.'" (James, *Psychology*, Vol. II., p. 363.)

3. "If the Prohibitionists want to prohibit everything that has evil in it, let them be consistent and stop not at alcohol, but go a little further and include the human tongue, of which the Bible says, 'The tongue can no man tame. It is an unruly evil, full of deadly poison; therewith we bless God, even the Father, and therewith curse we men made after the similitude of God.' (James iii: 8, 9.) Here is evil and good combined in the same thing, just owing to whether it is properly or improperly used, and the same is equally true of alcohol; although the Prohibitionists seem unwilling to admit there is anything but evil in it." (*Arena*, Vol. 8, p. 205.)

4. "What reply can be made to the following?—'You say that the prisoner is probably guilty. I grant it. But this only means that the prisoners in most cases of this sort are guilty. It does not mean that this particular prisoner has even a touch of guilt. Your very use of the word 'probable' is a confession that for all you know he may be absolutely innocent. How then can you ask the jury to condemn him to an awful fate?'" (A.)

5. "That they [the colonists] inherit the rights of their ancestors is allowed; but they can inherit no more. . . . The colonists are the descendants of men, who either had no vote in elections, or who voluntarily resigned them for something, in their opinion, of more estimation; they have therefore exactly what their ancestors left them, not a vote in making laws, or in constituting legislators, but

the happiness of being protected by law, and the duty of obeying it.

“What their ancestors did not carry with them, neither they nor their descendants have since acquired. They have not, by abandoning their part in one legislature, obtained the power of constituting another, exclusive and independent, any more than the multitudes, who are now debarred from voting, have a right to erect a separate parliament for themselves.” (Johnson, *Taxation no Tyranny*.)

6. “The existence of hell may even be, in one sense, an evidence of God’s mercy as well as his justice. It may be the best thing that can be done for natures which have confirmed themselves in sin. Suppose it had been proposed to Benedict Arnold, after his apostasy, to return to the colonies—ask the pardon of Washington—confess his wicked duplicity and treachery, and on these conditions be restored to citizenship. He would have known that such a course would promote his happiness, yet without a change of principle, he would have rejected it with contempt. Suppose further, that when the war was finished, and Washington had put down all power adverse to the happiness of the colonies, Arnold was found among the prisoners, having contended as long as he could against the government. His situation was now such, that any confession that he might make, or any pardon for which he might ask, could proceed from no other than selfish motives. When men fall into the hands of the living God, or into the hands of the executor of the law, repentance and love to the lawgiver are then impossible, because the motive determines the character of the act, and right motives in acting would then be impossible, because they would be necessarily selfish.

“Now, then, seeing repentance and love for the governor under such circumstances would be impossible, suppose the alternative had been proposed to Arnold either to spend his life in the presence of Washington, and in the society of those who knew him to be a traitor at heart; or to be

banished to an island which contained only rebels and criminals like himself, he would undoubtedly have chosen the latter immediately. Because, although the island would be a hell on account of the remorse of guilty consciences and the rage of evil passions that would exist and increase there, yet his nature had become so corrupted, that to live under the eye of the magnanimous Washington, and amid those who abhorred bad principles, would have been to his soul severer punishment than to live among the guilty and condemned in the island.

"Now, suppose Washington (knowing that his apostasy had so corrupted his nature that he would be less miserable to be banished from his presence than to continue in the society that made patriots happy), in view of his past life, and in view of the character he then possessed, had banished him forever from his presence, such banishment would have been not only an exhibition of justice but of mercy, and it would have been the best thing that could have been done for the man in view of his character and circumstances. So with God. Banishment to hell is the best thing that can be done for those who die in rebellion; therefore God has, in justice and mercy, provided a hell for fallen angels and impenitent sinners, who die unpardoned and unreconciled to God." (Walker, *Philosophy of Scepticism*, pp. 151-3.)

7. Old age is wiser than youth; therefore it is only reasonable that we should be guided by the decisions of our ancestors.

8. Two students who have never been suspected of dishonesty sit near each other in an examination and each of them writes these very words: "Henry George was the great orator of the Revolution; it was he who said in Faneuil Hall, 'Give me liberty or give me life.'" What inference can be drawn from this coincidence? How much should the inference be affected by the protests of the students that they were perfectly honest, or by their explanation that they had studied together? (A.)

9. "Manufacturing countries are always rich countries; countries that produce raw material are always poor. Therefore, if we would be rich, we must have manufactures, and in order to get them, we must encourage them. . . . But I could make as good an argument to the little town of Jamaica. . . . In support of a subsidy to a theater, I could say to them: all cities have theaters and the more theaters it has the larger the city. Look at New York! . . . Philadelphia ranks next to New York in the number and size of its theaters, and therefore comes next to New York in wealth and population. . . . I might then drop into statistics . . . and point to the fact that when theatrical representations began in this country, its population did not amount to a million, that it was totally destitute of railroads, and without a single mile of telegraph wire. Such has been our progress since theaters were introduced that the census of 1880 showed we had 50,155,783 people, 90,907 miles of railroad, and 291,212 $\frac{1}{2}$ miles of telegraph wires." (Henry George, quoted by Creighton, p. 377.)

10. "The canvas Raphael painted has endured for three centuries. But has God ordained that the canvas shall be preserved while the artist has fallen into dust? Is 'In Memoriam' more than Tennyson? Is St. Paul's Cathedral more than Sir Christopher Wren, its architect? Is the leaf to live, while the tree dies? Reason and conscience whisper, it cannot be. If thoughts live, the thinker cannot die. To suppose that death ends all is intellectually as absurd as it is morally monstrous." (N. D. Hillis, *Foretokens of Immortality*.)

11. "The soul is indivisible, incorporeal, unextended, and is consequently incorruptible. Nothing can be plainer than that the motions, changes, decays, and dissolutions which we hourly see befall natural bodies . . . cannot possibly affect an active, simple, uncompounded substance; such a being therefore is indissoluble by the force of nature; that

is to say, 'the soul of man is naturally immortal.'" (Berkeley, *The Principles of Human Knowledge*, § 141.)

CHAPTER XII

Examine the following arguments:

1. Should a church accept a saloon-keeper's gift (assuming that the church is justified in condemning the latter's business)? Consider the following discussions of the question:

(a) "If we are to rule out all contributors to church purposes, who are engaged in businesses that are not to some folks' liking, we will very soon find that we are making a mistake. 'The whole need no physician.' We should take such people into the congregation and try to make good Christians of them, instead of beginning by shutting the door in their faces and flinging their gifts after them."

(b) "I am not a believer in saloons, but in regard to receiving money from a saloon, I think it is just as good as another store or a private house. The saloon had to sell in exchange for the money as another store would have to do."

(c) "Saloon money is the price of broken hearts. Now for the Christian church to take the price of blood and offer it to God in sacrifice to carry forward his work in saving men would simply be an insult."

(d) "How can a church innocently accept and use for the furtherance of the world's evangelization, money passed over the bar in the grog-shop? Impossible, for besides the fact that it would be the receiver of stolen goods, there is the added guilt of the knowledge that it was stolen. The voice of victimized maidenhood, of abandoned wifehood, robbed womanhood, and impoverished childhood cry out in anguish against such an appalling injustice. The anguish of lost character and dehumanized manhood sound above the strife of nations against this dreadful sin. The ring of the thirty

pieces of silver as Judas flung them down on the marble floor was music to his ear, as compared with the unutterable and unbearable torture of the voice of his remorseful conscience for having received the price of blood. If we have but a spark of conscience within us, can we fail to see at once in this not only blood money, but the price of a soul? In the name of the world's blessed Redeemer—quick—'Get thee behind me, Satan.'"

(e) "Take it! If this money had a soul, it would cry out from its uttermost depths: 'Give me the opportunity! I have been forced into channels of darkness and evil! And now a ray of light and blessing beams on me. Oh, keep me not back.' If we refuse the money because of evil channels through which it comes, shall we not refuse other money for the same cause? And is not all money in this sense more or less contaminated? Yes. Take it; delay not, lest it be forced back to promote the greatest source of crime and brutality. Take it, that it may expand the church, its soul-saving, its charities, its blessed missions, and glorify God who gave it." (From the *Christian Herald*, August 23, 1899.)

2. What is the correct attitude as regards "tainted money"? Consider the following arguments:

(a) "There is no such thing as tainted money," declared a college president recently. "Human conduct in acquiring money does not attach to nor mix in the coin, nor lessen nor weaken the promise to pay upon the bank note. There is no such thing as 'tainted money.' Good moral money—that is, coin of full weight, and live promises to pay—good coin is good anywhere, in any man's hand. Truth takes no passing shadow to itself, and money cannot be impregnated by the deeds of passing users. Having this view of good money, I will accept it from any man who owns it."

(b) "It seems to me that instead of indignantly refusing large gifts from any one disposed to give for charitable

purposes, on the ground that the money offered by them is or was 'tainted,' i.e., earned in a manner not in accord with the popular idea of fair dealing, or secured by detrimental business practices, that it should be the duty of all Christians and charitably inclined people and good intenders to take all money offered for any good purpose. Why? Because every dollar taken from a man or firm engaged in evil or corrupt business, or who is a party to corrupt or evil methods in the conducting of a legitimate business, is a dollar's worth of power converted from evil to a good purpose."

3. "'Speakin' o' money,' said the night-watchman thoughtfully, as he selected an empty soap-box on the wharf for a seat, 'the whole world would be different if we all 'ad more of it. It would be a brighter and a 'appier place for everybody.'" (W. W. Jacobs, *Light Freights*, p. 1.)

4. "None of us can weigh or judge desert. No man can say, even of the seemingly vilest criminal, whether he is guilty or unfortunate. Take the foulest murderer you know of:—can you inform us whether that wretched creature has ever been so instructed in morality as to know what he has done?—can you tell us whether he has mind enough to be responsible to justice?—can you satisfy us as to his hereditary dispositions—as to his sanity—as to the impulse which led him to commit his crime—as to his education, parentage, early habits—as to the strength of the temptation which conquered him—as to his innate power of resistance? Can you even say whether his brain is healthy or diseased? No! you cannot speak as to one of these essential points; and yet you pretend to judge him (as you pray that God will *not* judge you) 'according to desert.'" (*Eclectic Review*, March, 1850, p. 225.) What answer can be made to this?

5. "Clearly, 'without free agency there can be no morality,' and 'without temptation no virtue,' and it is not consistent with the laws of Providence that because some abuse

an article which is good in itself [liquor], the vast multitude should, in consequence, be denied its use. This would be punishing the innocent many for the sins of the guilty few." (*Arena*, Vol. 8, p. 206.)

6. "Covetousness . . . being the root of all evil, should be early and carefully weeded out, and the contrary quality of a readiness to impart to others implanted. This should be encouraged by great commendation and credit, and constantly taking care that [the child] loses nothing by his *liberality*. Let all the instances he gives of such freeness be always repaid, and with interest; and let him sensibly perceive that the kindness he shows to others is no ill husbandry for himself, but that it brings a return of kindness both from those that receive it and those who look on." (Locke, *Some Thoughts Concerning Education*, § 110; quoted by Welton, p. 273.)

7. "But (say you) it doth but make men hypocrites to compel men to conform the outward man [in matters of worship] for fear of punishment. If it did so, yet better to be hypocrites than profane persons. Hypocrites give God part of his due, the outward man, but the profane person giveth God neither outward nor inward man. . . .

"You know not, if you think we came into this wilderness to practice those courses [viz., religious oppression] here which we fled from in England. We believe there is a vast difference between men's inventions and God's institutions; we fled from men's inventions, to which we else should have been compelled; we compel none to men's inventions." (John Cotton, *Hutchinson Papers*, Vol. II., p. 132.)

8. "Parson Lingon argues in favor of cock-fighting, not only that under it 'England had been prosperous and glorious,' but that 'the practice sharpened the faculties of men, gratified the instincts of the fowl, and carried out the designs of heaven in its admirable device of spurs.'" (Sidgwick, *Fallacies*, p. 216, note.) Discuss this.

9. "The Supreme Court of Colorado, in the decision by which it annulled the miners' eight hour law, asserts the principle that while the sanitary power extends to the protection of the health of the community at large, and even of the health of portions and classes of the community, yet it may not be exercised so as to protect these classes from their own acts. 'The reason for the existence of the power rests upon the theory that one must so use its own as not to injure others, and so as not to interfere with or injure the public health, safety, morals, or the general welfare. How can one be said injuriously to affect others, or interfere with these great objects, by doing an act which confessedly visits its consequences on himself alone? And how can an alleged law that purports to be the result of an exercise of the police power be such in reality, when it has for its only object, not the protection of others or the public health, safety, morals, or general welfare, but the welfare of him whose act is prohibited, when, if committed, it will injure him who commits it, and him alone?'" (Freund, *Police Power*, § 155.)

10. Read carefully the following extract from an article on "The Certainty of Endless Punishment," show to what type of argument it belongs, write a summary or outline, and suggest criticism:

"The chief objections to the doctrine of endless punishment are not Biblical but speculative. . . . So long as the controversy is carried on by an appeal to the Bible, the defender of endless retribution has comparatively an easy task. But when the appeal is made to human feeling and sentiment, or to ratiocination, the demonstration requires more effort. And yet the doctrine is not only Biblical but rational. It is defensible on the basis of sound ethics and pure reason. Nothing is requisite for its maintenance but the admission of three cardinal truths of theism, namely, that there is a just God; that man has a free will; and that sin is voluntary action. If these are denied, there can

be no defense of endless punishment—or of any other doctrine, except atheism and its corollaries. . . .

“Punishment is neither chastisement nor calamity. Men suffer calamity, says Christ, not because they or their parents have sinned, ‘but that the Works of God should be made manifest in them.’ Chastisement is inflicted in order to develop a good but imperfect character already formed. ‘The Lord loveth whom he chasteneth,’ and ‘what son is he whom the earthly father chasteneth not?’ Punishment, on the other hand, is retribution, and is not intended to do the work of either calamity or chastisement, but a work of its own. And this work is to vindicate law, to satisfy justice. Punishment, therefore, is wholly retrospective in its primary aim. It looks back at what has been done in the past. Its first and great object is requital. A man is hung for murder, principally and before all other reasons because he has transgressed the law forbidding murder. He is not hung from a prospective aim, such as his own moral improvement, or for the purpose of deterring others from committing murder. The remark of the English judge to the horse thief, in the days when such theft was capitally punished, ‘You are not hung because you have stolen a horse, but that horses may not be stolen,’ has never been regarded as eminently judicial. . . .

“If the good of the public is the true reason and object of punishment, the amount of it may be fixed by the end in view. The criminal may be made to suffer more than his crime deserves, if the public welfare, in suppressing this particular kind of crime, requires it. His personal desert and responsibility not being the one sufficient reason for his suffering, he may be made to suffer as much as the public safety requires. It was this theory of penalty that led to the multiplication of capital offenses. The prevention of forgery, it was once claimed in England, required that the forger should forfeit his life, and upon the principle that punishment is for the public protection,

and not for strict and exact justice, an offense against property was expiated by human life. . . .

"This theory breaks down from whatever point it be looked at. Suppose that there were but one person in the universe. If he should transgress the law of God, then, upon the principle of expediency as the ground of penalty, this solitary subject of moral government could not be punished—that is, visited with a suffering that is purely retributive, and not exemplary or corrective. His act has not injured the public, for there is no public. There is no need of his suffering as an example to deter others, for there are no others. But upon the principle of justice, in distinction from expediency, this solitary subject of moral government could be punished. . . .

"Supposing it, now, to be conceded, that future punishment is retributive in its essential nature, it follows that it must be endless from the nature of the case. For, suffering must continue as long as the reason for it continues. In this respect, it is like law, which lasts as long as its reason lasts: *ratione cessante, cessat ipsa lex*. Suffering that is educational and corrective may come to an end, because moral infirmity and not guilt is the reason for its infliction; and moral infirmity may cease to exist. But suffering that is penal can never come to an end, because guilt once incurred never ceases to be. The lapse of time does not convert guilt into innocence, as it converts moral infirmity into moral strength; and therefore no time can ever arrive when the guilt of the criminal will cease to deserve and demand its retribution. The reason for retribution to-day is a reason forever. Hence, when God disciplines and educates his children, he causes only a temporary suffering. In this case, 'He will not keep his anger forever.' But when, as the Supreme Judge, he punishes rebellious and guilty subjects of his government, he causes an endless suffering. In this case, 'their worm dieth not, and the fire is not quenched.' . . .

"The endlessness of future punishment, then, is implied in the endlessness of guilt and condemnation. When a crime is condemned, it is absurd to ask, 'How long is it condemned?' The verdict 'Guilty for ten days' was Hibernian. Damnation means absolute and everlasting damnation. All suffering in the next life, therefore, of which the sufficient and justifying reason is guilt, must continue as long as the reason continues; and the reason is everlasting. . . .

"It may be objected that, though the guilt and damnation of a crime be endless, it does not follow that the suffering inflicted on account of it must be endless also, even though it be retributive and not reformatory in its intent. A human judge pronounces a theft to be endlessly a theft, and a thief to be endlessly a thief, but he does not sentence the thief to an endless suffering. But this objection overlooks the fact that human punishment is only approximate and imperfect, not absolute and perfect like the divine. It is not adjusted exactly and precisely to the whole guilt of the offense, but is more or less modified, first, by not considering its relation to God's honor and majesty; secondly, by human ignorance of the inward motives; and thirdly, by social expediency. . . . Man, while not overlooking the guilt in the case, has some reference to the reformation of the offender, and still more to the protection of society. Civil expediency and social utility modify exact and strict retribution. . . .

"The argument thus far goes to prove that retribution in distinction from correction, or punishment in distinction from chastisement, is endless from the nature of the case. We pass, now, to prove that it is also rational and right.

"Endless punishment is rational, in the first place, because it is supported by the human conscience. The sinner's own conscience will 'bear witness' and approve of the condemning sentence. . . . That conscience supports endless retribution, is also evinced by the universality and steadiness

of the dread of it. Mankind believe in hell, as they believe in Divine Existence, by reason of their moral sense. . . .

"In the second place, endless punishment is rational, because of the endlessness of sin. . . . There are degrees in future suffering, because it is infinite in duration only. In intensity it is finite. Consequently, the lost do not all suffer precisely alike, though all suffer the same length of time. . . . Sin is stubborn and obstinate in its nature, because it is enmity and rebellion. Hence, wicked will intensify itself perpetually. Pride, left to itself, increases and never diminishes. Enmity and hatred become more and more satanic. . . . A man is not forced to sin, but if he does, he cannot of himself get back where he was before sinning. He cannot get back to innocency, nor can he get back to holiness of heart. The effect of vicious habit in diminishing a man's ability to resist temptation is proverbial. . . .

"In the third place, endless punishment is rational, because sin is an infinite evil; infinite not because committed by an infinite being, but against one. We reason invariably upon this principle. To torture a dumb beast is a crime; to torture a man is a greater crime. The person who transgresses is the same in each instance; but the different worth and dignity of the objects upon whom his action terminates make the difference in the gravity of the two offenses. . . .

"That endless punishment is reasonable is proved by the preference of the wicked themselves. The unsubmissive, rebellious, defiant, and impenitent spirit prefers hell to heaven. Milton correctly represents Satan as saying: 'All good to me becomes bane, and in heaven much worse would be my state.' . . .

"That endless punishment is rational is proved by the history of morals. In the history of human civilization and morality, it is found that that age which is most reckless of law, and most vicious in practice, is the age that has the loosest conception of penalty, and is the most

inimical to the doctrine of endless retribution." (*North American Review*, Vol. 140, p. 153.)

11. Further arguments for reduction to syllogistic form may be found in *North American Review*, Vol. 147, pp. 121-149; Vol. 133, pp. 550-9; *Cosmopolitan*, Vol. 34, pp. 597-9.

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